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JANUARY 1950

BUSINESS · ENGINEERING · INDUSTRY

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REPORT TO MANAGEMENT

Rising Costs, Tighter Markets Demand Cost Cutting

CHEMISTRY
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ELECTRICITY
ELECTRONICS
FOOD PROCESSING
MECHANICAL DESIGN
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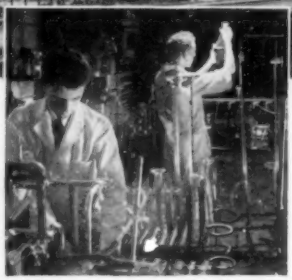
PROGRESS through *Cyanamid* RESEARCH

FROM CHEMICAL RESEARCH comes much of the world's industrial and scientific progress. Headquarters for American Cyanamid Company's research activities are centered in the Stamford Laboratories, shown here, the largest of several research laboratories maintained by the Company in the service of its customers. This entire building is devoted to research and the development of new and better materials, improvements in existing products, and discovering new and more efficient methods of processing them.



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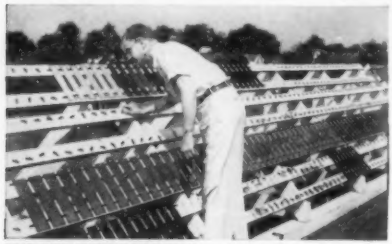

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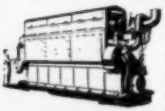

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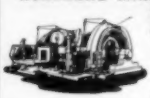

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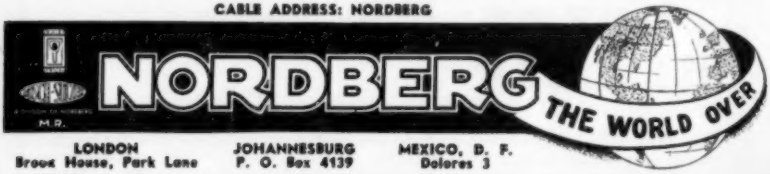

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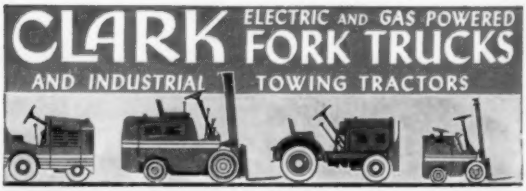

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Business Trends

U. S. BUSINESS OUTLOOK for the first half of 1950 is good. Steel and auto industries will continue to operate at a high level. Industry's buying of new plants and equipment is expected to drop slightly, and private construction work may continue to decline. But higher government spending is expected to offset much of the decline, at least through the first 6 months of the year.

Retail trade promises to stay at a high level. It will get a boost from a $2.8-billion life insurance dividend to be paid World War II veterans in the first quarter of this year.

Prices of basic raw materials are likely to continue to drift downward under the influence of the general leveling-off in business activity. Farm prices, to be supported another year by the government at close to war-time levels, are nevertheless likely to slide off 10%. Outlook in consumer goods prices is for stability with selective adjustments.

United States foreign trade, even though exports may decline as much as $1½- to 2-billion to a 1950 mark of nearly $11-billion, will stay at a high level. Lower prices will account for much of the drop in dollar value.

American exports will decline selectively. Part of the decline will be due to lower prices of U. S. exports. Also, exports of relief goods will shrink considerably. For example, Europe is expected to produce almost all the wheat and coal she needs. As a result, U. S. wheat and coal shipments will be smaller.

Prospects for exports of American machinery are excellent. European countires are expected to concentrate on the modernization and expansion of industry, and total imports of American machinery may well top the 1949 record level. Market for U. S. iron and steel products will also be good, although in a few years Europe should become practically self-sufficient in iron and steel.

Some shifts of U. S. export pattern can be expected as a result of devaluation. Devaluation makes it cheaper for European countries to import raw materials from the U. S. and to process them at home instead of importing the finished commodity. For example, exports of American cotton goods are likely to decline sharply, while cotton exports will stay high. Europe's textile industry now has the capacity to produce a large volume of finished goods.

There is growing pressure in the U. S. to dump surplus wheat and cotton abroad. Economic Cooperation Administrator Paul Hoffman is resisting the idea of using the Marshall Plan to cut down these surpluses.

Devaluation will not cause a trade upheaval. American goods will still be purchased to the full amount of dollars available, although buyers may be more selective in their purchases. European goods will compete more successfully with American goods in third markets, especially in Latin America. Where price is

Business Trends (Continued)

a secondary consideration, promptness of delivery and reliability are important points in favor of American sellers.

American imports will remain at a high level in 1950. The total value will probably be close to the 1949 figure, and any possible decline in dollar volume will be caused mainly by lower prices. Imported consumers' goods will be more nearly competitively priced than before devaluation. Several countries, notably Italy and the Netherlands, are planning vigorous promotional campaigns in the U. S. In general, the market for consumers' goods should be good.

Foreign basic commodities will not earn as many dollars in 1950 as in 1949. Demand for raw materials, such as rubber, is set by the level of industrial activity. It now seems that the 1950 output will be high, but not quite as high as it was in 1949.

Even though the devaluing countries have gained a certain competitive advantage, it is highly unlikely that they can expand sales enough to make up for the fall in prices. In many cases, the advantage gained by devaluation will be lost because of expected declines in U. S. prices.

Considerations other than price limit U. S. imports. Scandinavian woodpulp might well undersell the domestic product, but U. S. buyers hesistate to switch over to the foreign sources because of uncertainty of supply. A small price differential is not enough to capture a large sector of the market for the Scandinavian producers.

Some foreign basic raw materials will be favored in 1950 as a result of devaluation and of relaxation of U. S. restrictions. Natural rubber will be cheaper than artificial rubber, and manufacturers will be allowed to use a larger proportion of the natural product. Cured and canned Argentine beef will be once again competitively priced and should find a sizeable market.

LATIN AMERICA may suffer because of the decline of commodity prices. Dollar earnings will probably be lower in 1950 than in 1949, and the reserves accumulated in war years and in the immediate postwar period are almost exhausted.

Coffee prices will probably remain high because supply is short. Dollar coffee earnings for Latin America will be near a record level, but coffee alone cannot compensate for the general decline in dollar earnings.

But Latin America will provide good opportunities for European exporters. Dollar shortages will force tightening of controls over dollar imports. It is unlikely that new controls will be introduced, but the multiple-exchange system in many South American countries can be used to limit buying of U. S. goods, especially "luxuries" or those that are also domestically produced. European producers who can match the promptness of delivery and the reliability of American suppliers will have a chance to capture an important market.

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Washington Report

U. S. ISOLATIONISM is trying to come to life once again. You saw it coming last year—in the long and bitter congressional fights over Marshall Plan extension, reciprocal trade, and arms aid; in the Republican party, leaders who blame the "me-too-ism" of bi-partisan foreign policy for failures at the polls.

Now that Congress is back at work, party lines are accenting differences on foreign policy. Former Senator Dulles' defeat and the limited participation of Senator Vandenberg because of illness will permit Republican isolationists to move in to fill the vacuum in GOP foreign policy-making. That means an end to the coalition that fathered the Marshall Plan and Atlantic Pact.

Another point: economy-minded congressmen will try to cut government cost. The U. S. is currently spending $5-billion a year more than it collects in taxes. In an election year, money is not saved on such things as farm support prices, reclamation, defense, welfare. Instead costs are cut where it will not lose votes. This year that could mean fewer ECA dollars, less arms aid for Europe, and certainly no "Little Marshall Plan for Asia."

Talk of communist threats and the Russian A-bomb will still get attention from Congress. But the result may well be more billions for defense. Nationalistic congresmen have more faith in a big U. S. Air Force than they do in world economic recovery, or in equipping a European army with U. S. tanks and guns for Russians to pick up on their way to the Channel.

"Statism" is an accusation that will be heard often on the floors of Congress. It's the Republican war-cry, both at home and abroad. They see ECA using U. S. taxpayers' dollars to underwrite socialization of British steel to compete with private U. S. industry on world markets.

That is why ECA-Boss Paul Hoffman is encouraging the economic integration of Europe. He knows it will take more than an appeal to U. S. responsibilities as the world's biggest creditor nation to convince congressmen of the need—and justification—for $2.7-billion of third-year money.

Instead he is counting on steps like these to win Congress over: . . . Removal of intra-European import quotas . . . End of dual pricing—the practice of charging more to foreign customers than to domestic users . . . "Limited convertability" within Western Europe, meaning free transferability of the British pound in Marshall Plan countries . . . Further steps towards integration like Fritalux—union between France, Italy and Benelux.

NO NEW MONEY FOR THE FAR EAST—not this year anyhow. That is something you can count on whether the isolationists make their point or not. This does not mean that the U. S. will abandon its interest in Asia. You will still see loans by Export-Import Bank and World Bank to Indian and Indonesia. And

Washington Report (Continued)

administration leaders will find some way to send surplus U. S. food to India's millions, probably tied to the condition that Prime Minister Nehru write down India's blocked sterling balances in London.

The $75-million worth of arms aid Congress voted the Far East also will be parcelled out. Just who gets it is one of the things U. S. Ambassador-at-Large Philip C. Jessup will work out when he meets this month with Far Eastern consular representatives in Bangkok. Indonesia, Malaya, Burma, possibly India and Formosa will be high on the eligible list.

POINT 4 LEGISLATION now before Congress does not amount to much. Most congressmen consider the present State Department bill sloppy. They plan to write their own bill in committee.

The $45-billion that Congress is being asked to vote is largely spoken for. Some $13-million is specicfially earmarked for the United Nations technical assistance program. The rest would be spent on existing U. S. programs to improve farm production and health in Latin America and the Middle East. Talk around Washington of using India as a model for Point 4 has diminished.

Export-Import Bank will get authority to guarantee U. S. investments abroad against non-business risks, but only in countries signing investment treaties with the U. S. That rules out now everybody but Uruguay and Italy. Treaties with Brazil and India may soon be signed. Negotiations with other countries, however, are dragging.

Meanwhile, business opposition to the guarantee idea is mounting. Aside from a general dislike for government intervention, established investors think their own frozen funds should be freed before any new capital is guaranteed. Another question: who gets priority in taking out profits in dollars—the investor with a guarantee or the investor without one?

DIVIDING ECA AID is strictly a Washington operation now. Marshall Plan nations have already accepted Hoffman's plan for taking the job from OEEC in Paris. Under the new system, each country will submit its own schedule of dollar needs. Then Washington will adjust it to fit the total.

Reasons for the shift: (1) to free the OEEC staff in Paris and let it work out Hoffman's one-European-market idea; and (2) to end bargaining that has gone on between various nations—for instance, France agreeing to a chemical plant for Belgium if Belgium will vote for a French steel mill.

WORLD BANK is rounding out its investigation of Brazil's plans for hydro-electric and irrigation projects along the Sao Francisco River. Look for a loan approval shortly.

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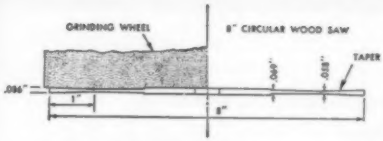
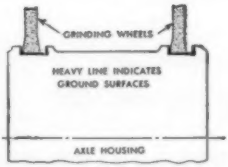


TRUFORMING MACHINE GRINDS CIRCULAR WOOD SAWS

IN 300% LESS TIME

This Thompson Circular Saw Truforming Machine grinds 8 inch high carbon steel wood saws in 2½ minutes. Formerly this job required 2 operations and 8 to 10 minutes on a circular single chuck grinder. Machine is available in 6 to 12 inch and 6 to 16 inch sizes.

HERE'S HOW



Thompson Hydrail Grinder (widest surface grinder built) reduces finishing time on massive diesel locomotive bearing housings and grinds to a tolerance of .0008" over 72" x 120" area. Machine illustrated is 72" x 36" x 120". In other industrial applications can sharpen large dies eliminating stripping down and assuring that all surfaces will be in correct relation. Horizontal or vertical wheel heads or both available. *Write today for details or other information concerning possible application of Thompson Surface Grinders in your production work.*

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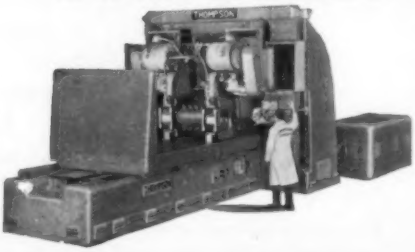
3-DAY JOB IN 2 HOURS

ON LOCOMOTIVE BEARING HOUSINGS



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January 1950 • McGraw-Hill DIGEST • Volume 5 Number 1

U. S. Clamps Down on Exports

The cold war becomes no colder as the U. S. recognizes leakage of goods and also ideas to Russia and takes steps to stop them now

RECENT CLAMPDOWN on the export of strategic materials and ideas from the United States is more than just a year-end updating of the positive export control list. It stems from a basic change in official Washington thinking that will effect buying in the U. S. more and more in the coming months.

The idea that Russia's war-production industries are technologically backward and capable only of limited production has been abandoned. In its place, Washington officials have a new respect for Soviet abilities, especially in machine tool, chemical and aviation fields, where concentration of effort and resources has been the heaviest. The change has been coming for a long time. The decisive argument came when President Truman announced that there was a Russian atom bomb.

First step, then, was to stop shipments of critical materials behind the Iron Curtain. This meant ending re-exports, as well as direct exports, that eventually were finding their way into Soviet industry. It meant too that the export of ideas—blueprints and formulae—as well as commodities had to be controlled.

Stops Goods and Ideas

This is why the U. S. made these two moves:

1. Export control lists were reshuffled to require export licenses on critical goods shipped anywhere in the world, rather than just to Europe.

Now, previous years' needs will play a big part in deciding whether or not you can successfully place an order in the U. S. The Department of Commerce will estimate requirements for various countries' economies and prohibit any shipments in excess.

2. U. S. technical and engineering societies agreed to a voluntary program to keep technical matter away from any foreigner who might pass it on to the Russians.

An additional reason for these two moves is the advent of Communism in the Far East as a de facto power to be reckoned with. State Department is just as anxious to keep U. S. strategic goods away from Mao Tse Tung as they are to keep them from Stalin.

Some Commodities De-controlled

Some good came out of the reshuffling, however. While a great many commodities were put under stricter control, at the same time quite a few were freed from control. The latter require no export licenses, no matter where they are to go. These are goods that were scarce in the U. S. right after the war and that Russia makes herself or can easily buy elsewhere.

Those commodities now held under tighter control include most classes of machine tools; chemical production equipment; certain chemicals; electronic equipment; diesel and diesel-electric locomotives; mining and quarrying machinery; petroleum field and refining equipment; metalworking machinery; pumping equipment; scientific instruments and apparatus; most steel shapes; petroleum products, especially lubricants.

Also included are military-type bus and truck tires; military motor busses and chassis; asbestos; mica; magnesium silicates; quartz crystal; cobalt; columbium; strontium; generators; electric transmission and distribution apparatus; electric motors over 1,000 hp; and other kinds of raw, semi-finished and manufactured goods.

HEALTH AND SAFETY, Eating and Sanitary Facilities . . .

How to Cut Costs

Help Employee Like His Job

Healthy, comfortable workers are efficient employees. Job must be made attractive if management hopes to reduce production costs

WORKERS WHOSE HEALTH and comfort are protected are more efficient producers. Companies that fail to provide for health and safety, eating facilities, sanitary facilities, good work furniture, recreation, and employee aids indirectly add to higher costs through worker inefficiencies. Workers *are* interested in factors other than pay rolls. Factors affecting employee morale and physical well being rate high on employee opinion survey.

The plant is no longer just a place to work. More and more it is becoming a place in which the worker lives.

Health and Safety—A healthy worker is less likely to incur accidents. Keener sight, fewer colds, better teeth, use of proper safety equipment contribute to a lower accidental rate. Prompt treatment of minor injuries reduces lost time, which otherwise would disrupt production and idle machines.

Size of health facilities depends on plant size. Small shops will require first-aid supplies and a specially trained employee, trained in first aid, who acts in case of minor injuries.

As number of employees increases, a dispensary is necessary with the services of a part-time nurse. In plants of 500 or more employees, one or two full-time nurses may be needed.

Number and severity of accidents directly affect the size of the medical department. Facilities should cover: treatment of minor injuries, pre-employment examinations, eye examinations, dental inspection, chest X-rays, periodic physical checkups, physical therapy, treatment for colds and dermatitis, treatment of serious injury or illness.

Eye safety should be stressed. Rules for safety glasses should be enforced. Case-hardened safety glasses, resembling standard glasses, will prevent most eye injuries. Safety clothing — including safety shoes with hard toes, protective gloves, dust masks, hair nets for women —should be required.

Eating Facilities—Lunch boxes of cold

WORK FURNITURE, Recreation, Employee Aids do Much to . . .

sandwiches and coffee are out of date. In-plant eating facilities, including cafeteria, snackbars, mobile food wagon, or a combination of these means, are often provided by manufacturers.

Cafeteria should be on the ground floor. It should be a place where the worker can relax. Division of the cafeteria into two sections is advisable so men in soiled work clothes will not be discouraged from using the facilities. Food must be good quality; menus must be varied. In the U. S. industrial cafeterias are run either by the management or by concessionaires who are specialists in in-plant feeding.

A snack bar is a supplement to, not a substitute for, a cafeteria. It may be open only at noon or during morning and afternoon rest periods. Choice of food is greatly limited—hot and cold drinks, sandwiches, pastry, candy.

Mobile food units are used to bring refreshments to production-area workers. Schedule of the mobile unit is set to meet plant conditions.

Sanitary Facilities—Workers seldom give the company credit for good sanitary conditions but always complain of poor facilities. If plant work is dirty, men must be provided facilities for changing from street clothes. Full-height lockers are [illegible] Showers should be provided if [illegible] change to street clothes before leaving the plant. For wash-up rooms, 10-man wash basins with foot-actuated pedals are available.

Work Furniture—Management only recently realized the importance of work furniture in bettering worker morale and output. Posture chairs are a basic necessity, being designed to give back support to the worker. Remember that chairs are always used in combination with bench, table, bin, or machine.

Chair height should be adjusted to worker, not to bench height. If operator stands for long periods, floor mats are desirable. Heights of work benches, desks, assembly lines, inspection benches, and machine depend on whether hands or eyes are of primary importance to the operation.

Recreation—Recreation should be encouraged during rest periods or off-hours. Management may provide the facilities and actually supervise the recreation or supply the money for it.

Municipally-provided facilities should be studied and the plant's facilities coordinated with those existing. A recent survey of U. S. plants shows that 70% of the plants have recreational programs, 55% being employee-directed.

Employee Aids—These facilities are offered to please employees and save them time—perhaps money. They include employee stores, in-plant machines, parking facilities, legal advice, bulletin boards, etc. These do much to foster good will among your employees, directly contributing to efficiency and morale.—Factory, Nov., p68

North American Trade Fairs

Long popular in Europe as a medium of expanding commerce and business, international trade fairs now come to U. S. and Canadian businessmen

NEEDLES AND HAIRPINS, nylons and felt boots, lingerie and lace, construction equipment and machine tools, shortbread and liquors, consumer goods and capital equipment—these are the fare of the international trade fair.

North America will see two trade fairs this year, and possibly a third. The Canadian International Trade Fair, patterned after European fairs, will again be held this year after two successful years in '48 and '49.

Reservations on exhibit space at Exhibition Park, Toronto, already point to a third successful year and indicate ready acceptance of the fair as a part of the merchandising programs of foreign firms trying to expand their markets.

Last year saw 115,000 people from 50 countries pass through the Canadian fair to view 1,200 exhibits. This year 200,000 sq. ft. of space again is available for foreign business men to show their products from May 29 to June 9.

The United States this year for the first time will be represented in the international trade fair field—at Chicago on Aug. 7 to 19.

Chicago is new to international fairs, but an old hand at commercial expositions. In 1948, she was host to 1,200 trade shows and conventions. The American Roadbuilders' show alone occupied 1-million sq. ft.

The same space is set aside for this year's international fair—at the Navy Pier, International Amphitheatre, Chicago Coliseum, and the Chicago Arena.

Other cities too are planning trade fairs. Philadelphia and Atlantic City have plans well advanced, but with no committments for this year. The Detroit situation has now been clarified. Originally scheduled for October 1950, the Detroit fair has now been set definitely for mid-1951.

An important question is, what would it cost you to exhibit at the Canadian or Chicago fair? Exhibit space is relatively inexpensive--$2.50 per sq. ft. at Toronto and $3.00 per sq. ft. at Chicago. Both have minimum fees of $300. Space is available in single or multiple units.

Transportation would be the big item on both personnel and goods. Daily living expenses would depend on how much entertaining you might do and the class of hotel you lived in. From $15 to $40 a day would be reasonable to expect. Although the dollar cost might present some problems, total expense need not be too great as promotion costs go.

←

"CROWD STOPPER" at 1949 Canadian fair, this zipper-enclosed conveyor belt drew immediate interest from South Africa, Brazil, Czechoslovakia, and other countries

Unique Equipment Cuts Shale-Mining Costs

In a U. S. Bureau of Mines experimental oil-shale mine, careful selection of equipment and mining plan has lowered total costs to $0.329 per ton. The oil-shale is a strong, tough marlstone unsupported over relatively wide spans. Beds lie nearly horizontal.

A standard 3-cu. yd. electric shovel loads 15-ton diesel trucks. Shovel handles 1,500 tons per 8-hr. shift. To keep shovel busy, a new jumbo has been designed. It mounts 4-in. air-driven percussion-type rock drills and is operated by two men. It drills 76 holes 15 ft. long. Each explosion drops 1,500 tons.

In a 2-day test run, 111 tons per man-shift was produced.—Eng & Min J, Nov, p92

Chemical Element Names

The symbol W, denoting tungsten, takes on a new meaning now that the official name of the element has been changed to wolfram. This is one of the changes in names of chemical elements adopted at the 15th International Union of Chemistry held in Amsterdam in September.

Columbium is now niobium, and beryllium was made official instead of glucinium. Lutecium and proto-actinium were modified to lutetium and protactinium. Technitium and promethium were respelled from an "eum" ending.

Six elements had their American names adopted internationally: astatine for element 85, francium for 87, neptunium for 93, plutonium for 94, americium for 95, and curium for 96.—Prod Eng, Nov, p157

Device Tells Track Gage

Track supervisor of Gulf, Mobile & Ohio Railroad has designed and installed on his inspection motor car an electrical device to show variation of track from true gage. Indicator, located at front end of car, consists of 11 colored lights above a scale of variations measured in ½-in. increments from ½-in. tight gage to ½-in. wide gage. Indicator is placed 12 in. above operators seat, providing quick, easy observation.

True gage shows as a yellow light. Wide gage shows red, tight gage as green. If a red or green light shows, car can be backed up and located exactly.—Railway Engrg & Maint, Nov, p1076

Convention Calendar

(Equipment Exhibited)

Mar. 28-31—National Plastics Exposition, Chicago Navy Pier, Chicago, Ill.

Apr. 10-14—American Society of Tool Engineers Exposition, Philadelphia, Pa.

Apr. 23-26—National Packaging Exposition and Conference, Navy Pier, Chicago, Ill.

Apr. 25-26—Metal Powder Show, Bo[illegible]-Cadillac Hotel, Detroit, Mich.

May 8-12—American Textile Machinery Exhibition (and Allied Industries), Atlantic City Auditorium, Atlantic City, N. J.

May 8-12—American Foundrymen's Society Convention and Exhibit, Public Auditorium, Cleveland, Ohio.

May 29-June 9—Canadian International Trade Fair, Exhibition Park, Toronto, Canada.

June 26-30—American Society for Testing Materials Annual Meeting and Exhibition, Haddon Hall, Atlantic City, N. J.

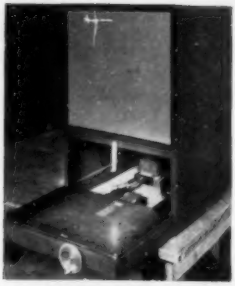
Aug. 7-19—First United States International Trade Fair, Chicago, Ill.

To anyone interested in any of these exhibitions, either as a possible exhibitor or visitor, the McGraw-Hill Digest will be glad to furnish additional information.

Survey Camera Takes Own Notes, Simplifies Work

Typical Shot

Topographic Camera



Office Projector

Developed by Republic Exploration Co. this topographic camera makes it possible to obtain leveling of third-order accuracy by an instrumentman with only a week's training. Camera records all readings for office evaluation; field note-taking is eliminated. Instrument consists of a 35-mm. camera with telephoto lens and reflex housing. On each exposure, camera records distance, direction, difference in elevation between unit and rod. Lens and prism system brings image of compass and sight card to camera lens. Length of shot should not exceed ¼ mi. Distance can be read to an accuracy of 5 ft. per 1,000 ft., aximuths to nearest 15 min.—Eng News-Rec, Nov 24, p38

Houses Made from Sawdust are Planned for London

London should soon have houses made from sawdust. The wallboard is being made by a process developed by Dr. Donald F. Othmer, Polytechnic Institute of Brooklyn.

Sawdust and shavings can be converted in 12 min. into a material resistant to termites, rot, moisture swelling, and shrinking. The process is inexpensive because no resin is needed to bind the particles together.

Adding a cheap chemical causes the lignin to hold the fibers together as it did in the original wood. Cost of the chemical is only 1/10 to 2/10 of a cent per sq. ft. The material is then pressed between heated platens.

About 2,000 sq. ft. of wallboard can be made from a ton of waste. For commercial operation, a minimum plant would require about 25 tons a day of wood waste. This would produce $1-million of wallboard a year at a chemical cost of $40,000. Plant cost would be about $400,000.—Paper Ind & World, Oct, p827

Cuts Clay Production Costs

Grinding costs reduced 30–50% and screen life increased 3½–7 times have been reported by users of electric screen heaters in the ceramic industry.

Made by Hannon Electric Co., the heater consists of step-down transformer which provides low-voltage heating current to bus bars on sides of screen. The screen itself completes the circuit, acts as a resistor, and is therefore heated.

Screen heat reduces moisture content of clay as it passes over the mesh. Result is that larger quantities of clay pass more readily through the screen before returning to the wet pan. Clogging of screen openings by wet clay is eliminated. —Elec C&M, Nov, p87

New Uses for Teflon Resin Include Tank Linings

Up to now Teflon—Du Pont's tetrafluoroethylene plastic—has been used only in simple shapes where its chemical and electrical inertness were useful. Now researchers have found five new uses for the plastic.

New uses result from the discovery that the resin could be produced as a suspensoid. The suspensoid is converted into a paste. Paste, after baking, fuses into a continuous plastic film.

New uses: (1) an industrial finish, spray-applied; (2) an enamel for wire used in motors and electrical devices; (3) an extruded coating for heavy wire; (4) an unsupported film of better quality and thinner gage than previous; (5) a coating for glass fabrics.—Business Wk, Nov 19, p44

Tanks can now be lined with Teflon. As a lining it will compete with glass and rubber.

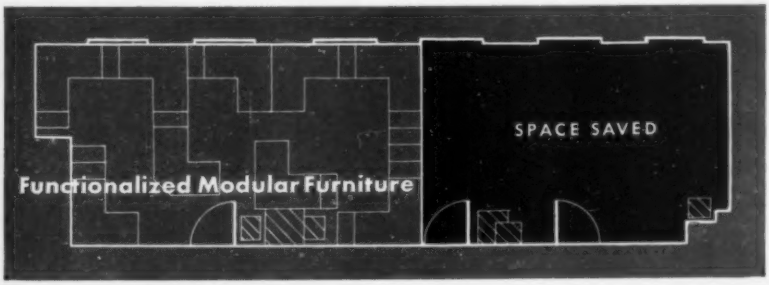
The material is applied as a sprayed coating. Before a tank is lined, the surface must be thoroughly cleaned, as by sandblasting and solvent degreasing. The Teflon primer coating is sprayed on, let dry, and baked at 750° F. to fuse the particles into one continuous film.

After cooling, intermediate and finish coats are applied and baked the same way. Number of coats depends on application. Teflon-lined tanks will be available in 1 year.—Chem Eng, Nov, p120

Ultraviolet Bath for Wine

Wines produced under ultraviolet germicidal lamps ferment faster, have minimum increase in volatile acids, and lose less alcohol. Lamps also inhibit spread of bacteria, mold spores, and yeasts. Those are the conclusions drawn from pilot-plant work by General Electric Co.

Lamps were installed over crusher, stemmer, press and wherever the juice was exposed to air for any period of time. Thus, all air coming into contact with the grapes was disinfected. Lamps also aided pasteurization.—Food Ind, Nov, p93



MODULAR OFFICE FURNITURE SAVES OFFICE SPACE

Time-and-motion studies conducted by E. I. du Pont de Nemours & Co. consultants have resulted in design of movable L-shaped desks with attached partitions for open-area offices. Conventional desks and table arrangement with a filing cabinet, one bookcase, one visitor's chair requires 80 sq. ft., not counting aisles or partitions. Du Pont-designed furniture provides the same facilities in 65 sq. ft. by adding a desk-high filing cabinet and putting a bookshelf above one side of the desk at the back. Modular arrangement provides privacy. Fluorescent lighting is independent of desks, permitting movement of furniture without moving lighting fixtures. Above, 412 sq. ft. provides working space for nine previously requiring 855 sq. ft.—Business Wk, Nov 12, p22

Sale of U. S. Know-How An E.C.A. Investment

You can now buy U. S. technical know-how as well as equipment under ECA.

The Economic Cooperation Administration now permits U. S. manufacturers to include in investment totals, on which the ECA would guarantee dollar convertibility, the value of American processes or know-how given to a participating country.

The agency hopes that the underwriting will attract additional private investment in participating countries. Previously, there has been a hesitation on the part of U. S. companies to invest their productive knowledge because there has been no allowance for its value.

Overseas companies that desire information on this new feature or who wish to contact prospective investors (U. S. companies) may write the DIGEST for further information.

Electricity Hatches Chicks

World's largest chicken hatchery, in Maryland, is completely electrified. It has 30 all-electric incubators, each with a capacity of 78,620 chicken eggs or 58,320 turkey eggs.

Power is supplied at 120/208 volts, three phase, four wire, through 1-million-circular-mil cable to the main switchboard. As a guard against power failure, which could endanger all eggs being hatched, a 100-kva. diesel generator set serves as a standby unit.

Incubators have fully automatic control to get precise temperature and humidity conditions. Made with redwood outside walls and plywood inside walls, the incubators are equipped with forced-air-draft heating and cooling system. Egg trays are turned automatically with a gentle, even motion.

Two 2,200-watt strip heaters are located in air-conditioning ducts to supply heat. A cold-water spray regulates the humidity and for cooling.—Elec C&M, Oct, p54

Move Building on Balls

A 3,100.ton stone masonry four-story office building and its 1,400-ton adjoining wing were moved by Spencer, White & Prentis, Inc. on 300,000 steel balls of $\frac{7}{8}$-in. dia. Balls rolled in track and runner beams. Heavy bearing walls were given added support during the move by a girdle of old bridge girders.

Both buildings were moved 216 ft., in separate moves, by self-retracting hydraulic jacks. Track and runner beams became permanent shoring for the building at the new site.—Cons Meth & Equip, Nov, p42

LIFTS CONVEYOR SECTION

Welding refrigerator cabinets at Westinghouse Mansfield Works is made easier by this air-operated tiltable conveyor section. It is controlled by foot valve so operator's hands are free to weld the bottom pan in the cabinet. A spring-operated stop near the fixed end of the section prevents cabinet from sliding.—Am Mach, Oct 20, p99

Discuss Paper-Mill Problems

Among the many problems confronting paper-industry executives are those of automatic-control use to raise productivity and of high power costs

TOP MANAGEMENT of American paper mills, in the first paper industry electrical conference sponsored by General Electric Co., considered the problems of management, research, production, and selling.

An important topic was operator productivity. It was pointed out that low efficiency may be improved by several methods at relatively low cost and high return.

These methods may be somewhat complex, as the installation of automatic temperature control of dryers, automatic head-box level control, or automatic jordan load control. Or they may be simple means—process metering, relocation of operators' control stations, or color coding and tagging of wiring to reduce maintenance downtime.

Even simple methods can mean a substantial saving over a year's operation. For example, a poorly located operator's panel on the calender section of a machine may cause an average delay of 5 sec. in rethreading the stack. At two breaks per day, there is lost nearly 1 hr. per year or about $1,000 worth of production.

The possible time and production savings from automatic control can be sizable. They should be investigated, with proper attention being given to better quality possible, production gain, and any additional maintenance necessary.

Another subject that received attention from the paper-industry executives was cost of power. This averages about 15% of the product cost. Mills can reduce this expense by:

(1) Recovery of waste heat.

(2) Selection of higher pressures and temperatures for steam turbines.

(3) Use of topping and extraction steam turbines where applicable. From 20–40% more kw. can be obtained from the same steam requirements.

(4) Proper selection of equipment, such as mechanical vs. electrical drive; gas turbine vs. steam turbine.

(5) Purchase of power in some cases.

Lower power costs result too from modern distribution methods. Other advantages are high service continuity and greater safety.

In metal-clad switchgear installations, for instance, all live parts are enclosed in grounded metal, contributing highly to safety of equipment and workers. Cable installation costs also can be reduced by use of interlocked armor cable. Important too is that provision for load growth can readily be made by proper selection of primary voltage and switchgear rating.—Paper Ind & World, Oct, p862

CONTROLS DRILL JIGS

Bolt holes are accurately spaced at Westinghouse Sunnyvale plant with 5-in. toolmaker's buttons. Bores in buttons are fitted with drill bushings. Dial indicator on swivel arm fixed to center post checks radial displacement of buttons. Chord distances are checked with two plugs clamped in a connecting arm.—Am Mach, Oct 6, p122

Technical Shorts

Chemicals Aid Footing Work—Chemical solidification of free-running sand fill was used in digging footings for a California stadium lighting system. Sodium-silicate solution—500 gal. per footing—under 200 psi. filled voids and cemented loose soil for period of construction. Eliminated was the necessity for extensive tunneling for the bell-shaped footings.—Eng News-Rec, Nov 10, p48

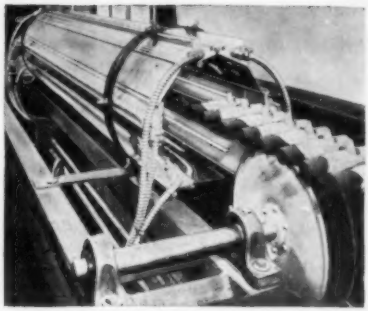
Floor Loads—A quick estimate on dyamic floor loading from industrial trucks can be made by assuming that their operation introduces stresses three times those under uniform loading. Thus, a floor having rated capacity of 50,000 lb. would allow truck weight of 16,600 lb. on concrete-slab floor.—Power, Nov, p95

Weighs Cattle—Electronic instrument can weigh cattle accurately even when they are moving on the platform. Sensing element is four strain-gage units placed under corners of platform. Weight is indicated by automatic printing unit. Similar devices can weigh moving railroad cars and large rolls of steel.—Electronics, Nov, p116

For Tired Taxi Drivers—Front seats on 1950 Checkered Cab Mfg. Corp. taxi cabs will have adjustable front seats to increase driver comfort. Seat can be moved up, down, forward, backward, or tiltwise. Seat has 200 possible settings.—Business Wk, Nov 12, p20

Promotes Haulage Safety — Safe, quick blocking of mine cars is provided at Hudson Coal Co. by steel-plate stops fabricated in the mine shops. Stops are shaped like truncated triangles. Slots are cut into rails to take tongues of stops. Weight of car trips against stop insures positive lock.—Coal Age, Nov, p102

Easy Way to Goodwill—Customer goodwill, demanded by keener competition, can be nourished by product containers that are easy to handle, store, open, and unpack. Welcome are containers, such as steel and fiber drums, that can be reused or have salvage value.—Chem Eng, Nov, p191



REDUCES CORE BREAKAGE

Wash-dipped sand cores are dried at Milwaukee Flush Valve Co. in an electric infrared oven. Breakage has been reduced as cores are dry in 2 min. after dipping. Oven tunnel is formed by six all-metal Chromalox radiant heaters supported by circular bands. —Foundry, Nov, p132

Steel Casting Contest — Cooper Alloy Foundry Co., Hillside, N. J., is stimulating interest in applications for cast stainless steel by technical-paper contests covering several fields. Cash prizes will go to winner of papers submitted before May 1 on "Applications for Cast Stainless Steel in Chemical Industry."—Paper Ind & World, Oct, p843

Pure Air—Office workers at Western Crown Cork and Seal Corp. get germ-free air because of Westinghouse Sterilamps installed in air ducts. Total of 92 lamps irradiate 30,000 cfm. of air at bactericidal wavelength of 2,537 angstroms.—Elec West, Oct, p70

Eases Truck Loading—A pushbutton-controlled, electrically-driven elevator loading platform at Charles C. Lewis Co. facilitates loading and unloading of trucks. The building is one story. Elevator eliminated necessity to dig a special driveway to permit level loading at a conventional dock. Plant floor is a few inches above ground level.—Ind Dist, Nov, p98

Better Fuel Utilization—Transportation industry offers best field for reduction in fuel use through better efficiency. Automobiles operate at only 6% efficiency. Possible means of improving utilization are higher compression ratios, supercharging, combination use of a continuously supercharged engine and gas turbine, and automatic transmissions.—Oil & Gas J, Nov 10, p277

Possible Fluorine Uses—Fluorine gas may help lubricate supersonic aircraft and guided missiles. The liquid may transfer heat, fill hydraulic systems and fire extinguishers. The solid may be hose material in fuel and oil systems and a filter medium for chemicals.—Prod Eng, Nov, p3

Hardens and Brazes—A manufacturer made stainless-steel knives in three operations: (1) brazing two halves of handles, (2) hardening blade, (3) soldering blade into handle. New method performs all three operations at one time in electric conveyor furnace using nickel-copper-zinc brazing alloy in wire form. Material cost is one-third of former cost.—Steel, Nov 14, p79

Avoids Slip Contamination—Lightning mixer for agitation at Perfection Stove Co. is mounted on a frame to allow it to be lowered into or raised from slip easily. Mounted, the mixer gives maximum trouble-free service and keeps slip free of contamination. Supporting frame is steel angle and channel.—Ceramic Ind, Nov, p61

Vacuum Diecasting—At recent International Foundry Congress in Amsterdam, a vacuum diecasting method was described for small parts that had to be free of entrained air. Die is placed above metal bath. Die is evacuated, and metal is drawn to die through connecting tube.—Foundry, Nov, p128

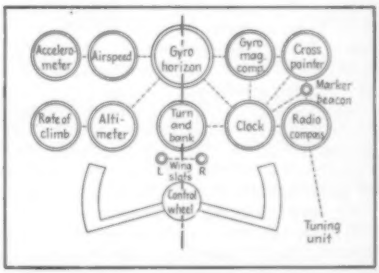
For Good Employee Relations—Long-service employees at Norton Co. are awarded recognition by their names being added to the company family tree. This is painted on the auditorium walls. Sweeper and vice president may be on the same branch. Only requirement is 25 yr. of service.—Am Mach, Oct 20, p127

Lays Continuous Rails—Great Northern Railway relaid tunnel track with 115-lb. continuous rail. The 39-ft. rails were pressure-welded together to 1,326-ft. lengths. Welded lengths were carried to site by string of 25 roller-equipped flat cars and unloaded by fixing one end and pulling cars from under the rails.—Weld Eng, Nov, p26

Boon to Bane—Fly ash may eventually become a boom instead of a bane to electric utilities. Promising experiments point to its possible value as a soil stabilizer for road construction.—Elec World, Nov 12, p3

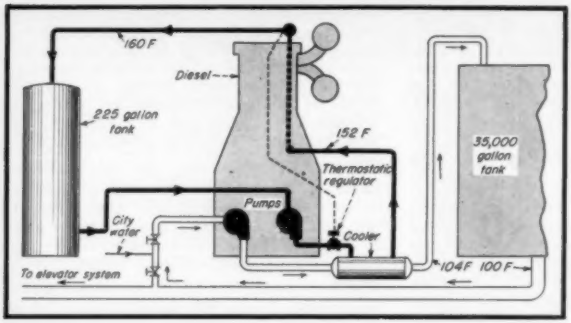
Truck Crane for RR Maintenance—Chicago, South Shore & South Bend Railroad uses a 6-wheel crane truck for rail maintenance work. Two men operate truck. All track is laid by truck. It operates either on the right-of-way or on the ties.—Railway Engr & Maint, Nov, p1073

Stirs Pigment Into Paste—Commonwealth Engineering Co. has developed a process for combining resins and oils that will permit paint and plastic manufacturers to use continuous instead of batch processing. Heavy milling, previously necessary, is eliminated. Better control, lower equipment and labor costs result.—Business Wk, Nov 19, p78



EASY-TO-READ PANEL

Designed to fit the psychological and mechanical needs of the pilot, this plane instrument panel arrangement was designed by Ralph H. Miner. All instruments used are in wide use today. Arrangement is based on reduction of eye travel (dotted lines) to eliminate mental lapses.—Aviation Wk, Nov 28, p32



DIESEL ENGINE COOLED FREE

This idea can be used in plants having hydraulic elevators. A New York City building cools its diesel-engine jacket water by circulating it through cooler which is supplied water cooled by elevator system's storage tank. Jacket water is cooled from 160 to 152° F.—Oper Eng, Nov, p30

Melting Nonferrous Metals With Lift-Coil Furnaces

Production requirements of the foundry at National Cash Register Co. are such that small heats of about 160 lb. per charge are necessary. Largest castings weigh only 1¾ lb. while smallest ones weigh as little as ⅛ oz. Castings are copper-base alloys.

Because of these requirements and also the high quality that must be maintained, lift-coil induction melting furnaces have been found to be best suited. Two Ajax high-frequency generator units—one 100 kw. and the other 175 kw. —have been installed.

The furnace coil is made of copper tubing through which water passes for cooling purposes. The coil carries the high-frequency current and generates the field to which the charge is subjected.

An insulated box supports the coil. Box and coil can be raised or lowered around the clay-graphite crucible holding the charge. During melting, the crucible rests on an insulating pedestal.

Melting is fast because large amounts of power are concentrated in small charges and a large quantity of refractory material is not heated. Heat losses are small.

Other advantages are long crucible life, good flexibility, minimum maintenance, and excellent working conditions. Metal produced is clean and free from inclusions and trapped gases.—Foundry, Oct, p76

Strip-Mining Phosphate Rock

To strip-mine 786,000 tons of phosphate rock, Simplot Fertilizer Co. had to remove 900,000 yd. of topsoil, 155,000 yd. of limestone caprock, 1,800,000 yd. of shale. The stripping ratio of ore to waste being 1:5, careful consideration of equipment and methods was necessary.

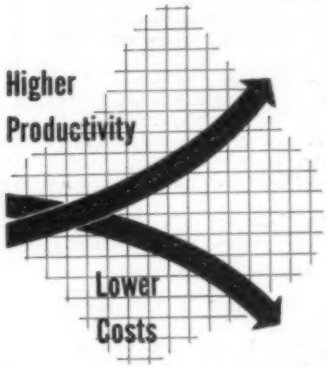
The company found bulldozers and scrapers best for removal of top soil, maximum economic hauls being 300 and 500 ft. respectively. Phosphate shales are loaded into trucks by 2½-yd. shovels. For high-grade ore, ¾- and 1½-yd. shovels proved better for loading because of selectivity with which operator controls the smaller shovel.

Since phosphatic shale beds vary considerably in vertical range in the geologic column, stripping by benching was necessitated. After removal of overlying caprock, bed is cleaned lightly by bulldozer. Actual removal of ore by shovels is simplified by an abrupt change in color designating footwall. Bed proper is black to dark grey; footwall is red-brown siltstone.—Eng & Min J, Oct, p92

Report to Management

Rising Costs, Tighter Markets Demand Cost Cutting

CHEMISTRY
CONSTRUCTION
ELECTRICITY
ELECTRONICS
FOOD PROCESSING
MECHANICAL DESIGN
METALWORKING
MINING
PLANT MANAGEMENT
POWER
SELLING
TEXTILES
TRANSPORTATION



The road to cost reduction is not easy. Long and rough, it demands hard work, persistence, enthusiasm, and constant, careful attention to details. Methods vary from company to company, from industry to industry. And for any one company or industry, the over-all plan must be tailor-made. It must be planned with particular attention to individual problems in organization, administration, product design, facilities, purchasing, production management, operating and processing methods, and personnel management. But throughout over-all cost reduction, there is a similarity of needs and of interest. To make sure that this report would bring the information that most of you need to halt rising costs and diminishing profit margins, we asked 3,500 of our readers to tell us exactly what they wanted. The next 23 pages bring you our answer.

How Management Engineers Cut Costs

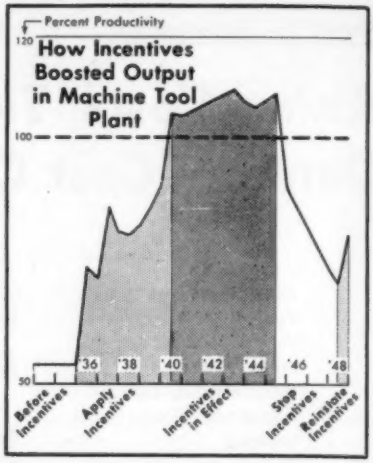
CONTROLLING COSTS is a management job that never ends.

But cutting production costs does not always get proper attention from management. During World War II, production was the important factor. Costs were secondary. Immediately following the war, pent-up consumer demand again made production of primary importance.

Now times have changed. The seller's market is past and we are in a buyer's market. Material and labor costs have risen rapidly. These, plus higher selling costs, have squeezed companies' profit position.

Costs must be looked at closely. Each company head must ask himself "What can I do to get a better picture of costs?" Then arises the question "How can I reduce these costs without impairing plant efficiency, product quality, or sales volume?"

These questions are often answered best by consulting management engineers.



Not All Cost Cutting Wise

Not all cost cutting is wise per se. Arbitrary actions must be avoided. Do not cut production, trim payrolls, slice prices, reduce promotion, or stop capital spending arbitrarily. Start at the right place. Start with a management audit.

Financial audits are not much help in cutting costs. They tell what went on, not what goes on. A management audit on the other hand brings the current situation into view. Griffenhagen & Associates, consulting engineers, have a formula for a management audit which they follow closely.

Organizational structure must be studied and the functions of each clearly defined. Production and distribution are checked closely to determine work responsibility, effectiveness of labor, and why, where, and when things are done. Personnel policy is checked.

Final step in the audit is an analysis of physical facilities—plant, equipment, materials.

After the broad check is made, you are in a good position to revamp your operation. Business Research Corp. starts a revamp job with a profit-and-loss budget for each part of the plant. This sets up a production operating goal for each department.

Second step is to locate weak spots:

- Look at your product, product line. Can it be simplified.
- Make sure your plant is using the latest developments.
- If layout is not efficient, make it efficient.
- Look at direct labor to see if you are improving efficiencies.
- Study maintenance. Planned, regular scheduling can cut costs.
- Check office force to see if jobs may be eliminated.
- If distribution system is old, selling costs too much.

After policies and practices are checked and weak spots shown, look at personnel. Make certain that the best possible persons are doing the jobs they are best suited to. All activities, jobs, and departments should be clearly defined to eliminate overlapping. This gives management more time to manage.

Costs in All Operations

Costs run through every operation from purchase to sale. But you cannot control costs unless you know what your costs are. Past performance may be your base.

Scovell, Wellington & Co. says that the exercise of cost control requires: measuring results against some standard; fixing responsibility for results; defining action of those responsible for operations.

Dyer Engineers have worked out a method of "workable" cost control, involving determination throughout the plant of normal costs. Each process is charted daily, at point of cost, to determine departures from set-up norm. The system includes a bonus plan covering everyone for all work done in excess of the normal.

Check Office Indirect Labor

Indirect labor, in office as well as plant, can add greatly to production costs. Most companies lack a measure of the work-output of these employees.

Booz, Allen & Hamilton believe the rise in indirect labor is a hangover from the war. Indirect labor costs must be studied from the viewpoint of what each job entails, whether the job is necessary to the operation, and whether full efficiency is being obtained.

To make such studies, McClure, Hadden & Ortman suggests the use of the same principles as used in studying direct labor productivity.

Value of good production planning is known to all manufacturers. Most companies use production planning in one way or another, but few capitalize on it as they should.

Wallace Clark & Co. raised production per man-hour 30% by proper balancing of centralized planning for long-range production and decentralized planning for day-to-day work. Work loads were first determined and flow of work through the plant was checked. Now delivery dates can be accurately estimated. Overloaded production units are easier to spot. Machine nearing "no work" can be checked quickly and work made ready before shutdown.

Quality Control Saves Scrap

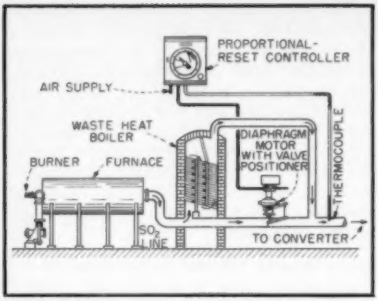
Business Research Corp. believes that if your combined manufacturing costs of scrap and rework exceed 1%, you should investigate quality control. It reduces manufacturing costs by cutting down: salvage and rework expense, scrap, inspection costs, tool expense. Quality control cuts sales costs by: reducing service and replacement charges, eliminating complaints.

Management usually looks at maintenance costs as the total of materials and labor. Forgotten are the hours of production and service lost through bottlenecks in maintenance operation.

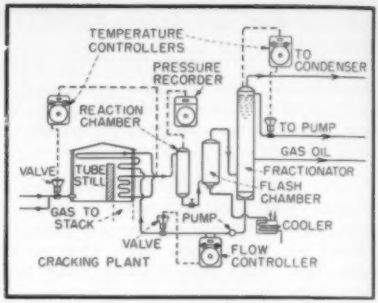
Maintenance program can best be attacked by: identifying principal causes of breakdown, setting up preventive maintenance program, improving maintenance methods, checking maintenance parts inventory, reviewing maintenance organization in relation to operating departments, and establishing a budget reflecting "should-cost" figures for work.

Incentives Help

Incentive plans are important in raising production. Accurate evaluation is the basis for good incentive programs according to Albert Raymond & Assoc. They can take the form of extra pay over base rate, job upgrading, promotion, or profit sharing. If individual performance is hard to measure or where work performed is variable, incentives can be provided on a group basis.—Business Wk, Sept 24, p49



CHEMICAL-PROCESS control is illustrated by this device to control reaction heat in burning S to make H_2SO_4



PETROLEUM distillation is controlled as to feed rate of oil into refractionating column by proportional controller

Planning Automatic Process Control

PRACTICALLY ANYTHING that can be measured can be controlled. Control of industrial processes at first was crude, depending on human senses of operators.

Then came measuring instruments—glass mercury thermometers, electric meters, and other mechanical and electrical devices. But they are only as useful as the operator wants them to be. So the next logical step is to complete the path of action from recorder to controlled element to make corrections automatically.

The trend is decidedly in this direction. Productivity in industries using continuous or batch processing is being increased significantly by changeover to automatic control. Electronic instrumentation and control are being favored. They are greatly expanding the list of measurable variables, including even such elusive quality factors as chemical composition.

Automatic control improves product quality and lowers processing costs. By reducing number of rejects, it reduces production costs. A good example is in plastic molding. Automatic temperature control of the molding dies keeps them hot enough for required plastic flow and yet does not slow press operation.

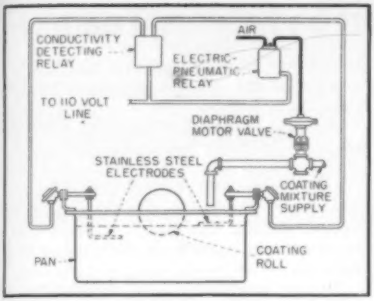
Automatic control also increases the output capacity of a given plant. In a petroleum plant, for example, capacity is increased by stepping up fluid velocities and reducing the amount of stored liquid capacity. This is possible because of rigid automatic control over every stage of the process.

Available Types of Controls

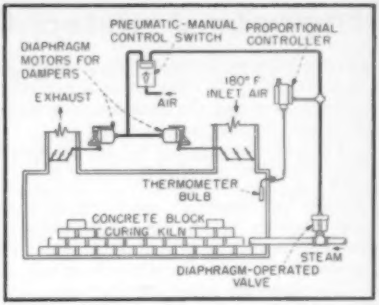
Basic types of control systems are (1) two-position, (2) proportional, (3) proportional-reset, and (4) floating. The first three are available in both electric and pneumatic forms, the fourth only in electric.

Choice of a basic type depends on nature of process and required accuracy of control. Choice between electric and pneumatic controllers is governed by availability of air supply, existence of explosive or flammable conditions, and nature of the device to be controlled. Certain characteristics of the basic types must be considered in planning systems.

The two-position controller is simple and generally satisfactory for processes that respond quickly to a valve or other control device. Best applications are



PAPER COATING is made uniform by controlling level of coating mixture in supply pan with conductivity relay



CERAMIC CURING of concrete blocks is proportionally controlled as to kiln temperature during steaming period

those such as the temperature control of a cooking kettle where the only load is that of maintaining a heat balance against radiation losses. This type is not perfect when there are large or sudden load changes.

It operates by moving the final control device back and forth between two fixed positions of travel in response to changes detected by the sensing element. These two positions may be the open and closed positions of a valve.

In a proportional controller, the position of the final control element varies proportionally with the position of an indicating pointer. Corrective action is taken almost instantly.

For Pneumatic Installations

Proportional control is ideally suited for pneumatic installations because air motors are available in all needed sizes to move valves and dampers smoothly and provide intermediate positioning. Electric installations are more costly.

In normal operation, a proportional controller develops permanent drift from the control point. As a result, the value to be held constant drifts above or below the desired condition. This can be eliminated by automatically resetting control to proper point after each correction.

The proportional-reset controller has an automatic reset that returns the pointer to the control point after each load change. It therefore gives precise control and is used more than any other type of controller on continuous processes.

Floating Control

The floating control is similar to the two-position control. One difference is that the final control device moves gradually rather than suddenly between open and closed positions whenever the controlled variable gets outside the neutral zone. Then as the variable enters the neutral zone again, the valve floats at whatever position it happens to be in.

This type of control is little used except for fast-moving processes. It is applicable only to processes having limited time lags. Any appreciable time lag causes excessive overshooting and wide cycling.

The control-system designer must remember that the final control device is as important as the sensing element and the controller. It may be a valve, damper, motor, or some other device. Valves are generally operated by diaphragm air motors, while electric process-correcting devices use electric motors or solenoids as power units.—Electronics, Oct, p72

Engineer, Architect Can Save as a Team

IF THEY WORK TOGETHER with a thorough understanding of each other's function, the engineer and the architect can make deep cuts in construction costs.

The engineer should not be presented with a finished set of plans that will limit his construction work and ingenuity. Rather, the architect should work with the engineer on the plans, drawing on the engineer's knowledge of such details as decoration, wall sections, room layout.

There are six important factors affecting cost of concrete frames:

- Type of framing selected and its arrangement.
- Degree of correlation of architect's and engineer's work.
- Economy in use of reinforcing steel.
- Simplicity and repetition in use of formwork.
- Use of finished concrete surfaces to cut out plaster.
- Adaptability of architectural details to concrete construction.

Four points should be kept in mind when selecting framing: standard beam and girder, flat plate, wide beam and slab, and beam and two-way slab. Of the four, the last is the most expensive. Usually the flat plate will prove most economical in housing.

Framing layout should be carefully checked to give flat ceilings. Beams, girders, and columns should be of such size and so spaced as to reduce furring. This may result in a waste of concrete, but the saving in furring costs will offset the larger amount of concrete used.

Building shape is important. As a rule, rectangular shapes are cheaper to construct than angular plans. The smaller the ratio of perimeter to floor area, the cheaper the building is to construct.

In considering the use of steel, it should be remembered that reinforcing is the most expensive item in reinforced concrete. Cost can be reduced by using simple reinforcing patterns and few bar sizes and by eliminating bent bars if possible.

Amount of reinforcing to be used can be cut by: (1) selecting the proper framing and making careful analysis of the frame and (2) through use of greater depth of slab and beam than balanced design would indicate. High-strength concrete will contribute to reduced reinforcing.

Design simplicity and uniformity of framing permit maximum reuse. Beams should be of standard lumber dimensions to avoid cutting. Depth of beams should be as uniform as possible, and typical floor and roof plans should permit the same forms to be used for both jobs.

It is desirable to use controlled concrete throughout a structure. Added cost is offset by other savings. But the concrete must be accurately controlled. High-strength mixes, too, can help cut costs.

Substantial savings can be made through elimination of plaster from walls and ceilings. Forms must be carefully constructed and aligned to obtain surfaces ready for final painting. Reuse of such forming is limited.

Other points in construction where costs can be reduced are:

Stairs—Reinforced concrete stairs—scissor type—are cheaper than steel. Forms made of steel sections and plate reduce costs.

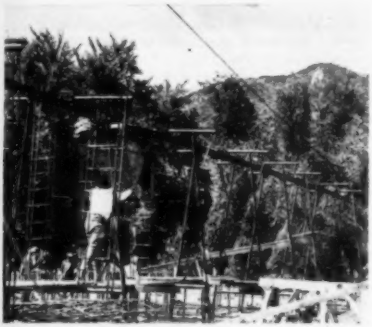
Partitions—Block partitions are easier to fit into a concrete frame than those of plaster and metal lath. Channel runners on the ceiling are slow to affix. If they are used, pneumatic guns that shoot nails into ceiling can speed up the job.

Floor Openings—Plumbing slots, two per bathroom, suffice to eliminate horizontal runs of pipe. Large openings should be kept away from columns in slab construction.—Eng News-Rec, Oct 27, p50

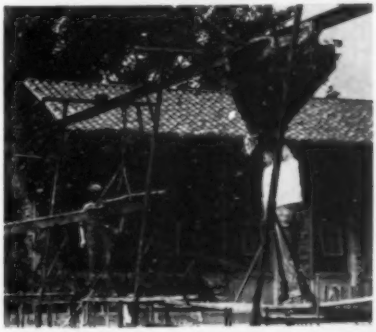
Monorail Reduces Concreting Costs

You can eliminate costly buggy runways for moving concrete for building slabs with a monorail of welded pipe frames carried on forms. Daily pours can run up to 140 cu. yd. with system. Car-pusher spots chute and operates discharge gate. System is suited for delivery of concrete by transit-mix trucks. —Cons Meth & Equip, Oct, p46

1 Concrete arrives in transit mix trucks and is raised in ¾-yd. bucket to monorail car. No operator is needed at hoist.

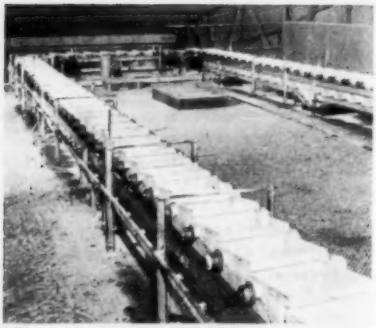


2 Track is supported on welded pipe A-frame set in sleeves on slab form. Car can be pushed, unloaded by one man.

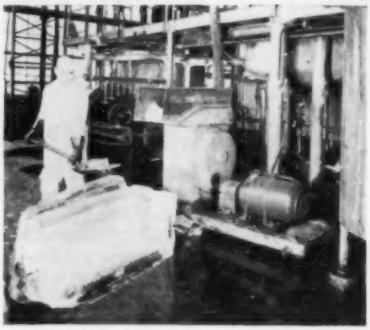


3 Intake end of chute is chained to rolling carriage which also rides rail. Chute can be shifted to either side of rail.

4 Car-pusher operates discharge gate. Chute is moved easily. Flat-angle of chute may require shoveling to keep concrete moving down flat-angle chutes. This arrangement for moving concrete was developed by Thomas Bates & Sons, contractors.



RUNAROUND CONVEYOR is suited to fragile materials such as small hollow spheres



ICE CRUSHER simplified handling of ice and improved product crystallization

Better Handling for Better Processing

CHEMICAL PLANTS today are not uncommonly laid out around the materials-handling system. Full realization of its importance and its possibilities in cost reduction came during war-time production.

Volumes and quantities involved were huge, and speed was paramount. The improvements adopted then have had a marked influence on today's methods.

It is realized by plant executives that mechanized handling, provided that it enables a given capital investment to increase output volume, will improve both fixed charges and profits. Also, it makes handling safer, tends to increase skills, and so leads to appreciation of devices or methods that increase output with less effort.

Gadget-Minded People

This fact highly impressed a group of British industrial leaders who recently completed a tour of U. S. plants. One commented, "People in the United States are so gadget minded they won't work long at a job without trying to rig up a gadget to speed up the job or do part of it for them. That is why the American worker produces more than most British plant workers, without exerting more effort."

Frequently better handling not only reduces operating costs but also substantially improves the functioning of the processing equipment. During the war, for example, a runaround conveyor was developed to feed continuously flake magnesium chloride to a battery of electrolytic cells. It did the job without the excessive degradation caused by the previously employed scraper conveyor.

Handles Fragile Pellets

This type of carrier has found a place in the chemical industry. At top left is shown an installation for handling fragile pellets, or thin-shelled spheres, weighing about 10 lb. per cu. ft. Known as the Side-Kar Carrier, it handles up to 700 cu. ft. per hr. at 16 fpm. along a rectangular path 70 ft. long by 12 ft. wide.

A Chicago chemical plant by a clever handling arrangement improved its product. Previous method was to hoist ice cakes to a charging platform where an operator broke and shoveled them into a tank.

PLATTER CONVEYOR is an efficient way to move drums along long wharves

PLATFORM CONVEYOR may be right freight handler, depending on traffic and route

Purpose was to chill a solution for crystallization. But the ice chunks were large, so their relatively small surface caused undesirable large crystals and occlusion of solvent in the crystals.

A simple ice crusher-slinger was installed. It pulverizes and sprays snow-ice into the tank. The greater surface area of the finely crushed ice provides quicker cooling and control of crystal size. Being portable, the ice machine can be pushed from one tank to another as needed.

Conveyors Not Obsolete

Although industrial trucks are gaining tremendously in use, conveyors are by no means obsolete. The platter conveyor illustrated moves oil drums along a long wharf, to and from barges.

This job required an analysis to determine the cheaper method—a reversible conveyor or a tractor train. Assuming three-shift operation and traffic of 75 drums per hr., tractor-train equipment would be one tractor, one spare, and 12 trailers of five-drum capacity each.

This investment would amount to about $10,000. Operation would require three operators at $10 per day each, plus a part-time charge for a maintenance man.

The conveyor with a 15-hp. motor would cost $20,000 erected. Power, labor, and maintenance costs would be substantially lower. The investment is larger than for the tractor train, but the life of the conveyor with ordinary replacement of worn parts should be at least 15 years.

Next illustrated is a borderline case. There is a direct movement of miscellaneous freight to floor storage and back. A reversible apron coveyor with a light power hoist may be provided to load and unload the platform conveyor.

Traffic in this application is intermittent. If a truck could function elsewhere when not needed for freight movement, it might be the deciding factor in favor of the truck.

The Savings Are There

Possible savings on such installations are not always easy to demonstrate. Conveyor manufacturers should not be expected to guarantee savings. One reason is that he has no control after his equipment is installed.

The manufacturer of industrial trucks has an advantage here. He can send a machine and trained operator into a plant to prove, by actual demonstration, the results that can reasonably be expected and how the equipment can pay for itself.
—Chem Eng, Oct, p102

Cost Cutting in Metalworking Plants

"IF WE CAN CUT $50 from the production cost of our most popular model, we can sweep the market," said *Sales* of a refrigerator maker, according to legend. *Administration, Accounting, Legal, Engineering,* and *Purchasing* agreed. Only *Manufacturing* was hesitant. "I'd like to do it," he said, "but my cost on that model is only $40."

This tells only too well how production costs are traditionally first to be thought of when costs must be cut. And there are hundreds of ways of cutting production costs in the metalworking industries.

The following suggestions are but a few of these ways. They deserve study because not only do they lead to lower costs but they also are suggestive of many more ideas which you can apply in your plant.

Planning—Analyze all operations for ultimate elimination. Combine operations where handling can be reduced and savings made. Examine operations for possible improvement by change of sequence. . . . Remember that some troublesome operations may be eliminated by slight changes in product tool design. . . . Maintain sufficient machinability records or ratings to allow a truly economic comparison of materials and methods.

Purchasing—Make sure that definite minimum quantities of stock items are posted on stock records. Provide material-control department with average delivery time for these items to permit them to plan for replacement. . . . Check on transportation for every order. . . . Check new equipment, parts, and materials in business publications regularly.

Place open orders monthly with suppliers of fast-moving items to minimize paper work and accounting. . . . Allocate the cost of purchasing to each department and include it in that department's overhead to control irrational ordering.

Equipment Selection—List the qualities and facilities you want in new machines. Know the power needed—don't buy a 50-hp. milling machine if a 15-hp. machine will handle 99% of your work and the other 1% can be run at reduced feed. . . . Keep in mind the number of pieces to be made. . . . Look for a special-purpose machine whenever you have more than one machine doing the same repetitive work. . . . Attachments may save their cost.

Consider machines that have some form of tracer or templet control to allow the use of less-skilled labor, reduce production time, minimize scrap. . . . Don't buy a machine until you have the floor space for it. . . . Avoid buying all the

gadgets offered. Study each one to see if it will save time and money.

Broaching—Always consider broaching for long-run production. . . . Be sure that the machine is heavy enough for the job. Gradual increases over a period of time will accumulate until they exceed capacity. . . . Use fixtures that can be unloaded and reloaded while cycling.

Avoid solid steel or carbide broaches. Detachable shanks, of less expensive steel, save money. . . . Sectional broaches permit removal of first section when it wears and moving forward of other sections. . . . Free flow of proper cutting fluid is mandatory.

Drilling—Suit the job to the machine. Some boring, honing, and grinding jobs can be done on a drillpress. . . . Don't overload a drill and thus affect spindle precision, but don't underload it by using a small drill in a slow-speed machine.

If much close-tolerance work is to be done, equip a radial drill with a spacer table. Many jobs can then be handled

with only clamping and locating devices instead of a series of jigs. . . . Have your toolcrib men issue new drills only for close-tolerance work, keeping worn drills for rough work. . . . Insist that drills be sharpened with a suitable fixture or machine and checked by gage after sharpening.

Grinding—Fit grinding-wheel specifications to the job. A wheel too fine or too hard means longer grinding time,

higher cost, more frequent dressing. . . . Determine whether work speed, depth of cut, and traverse rate can be increased to reduce time.

If grinding is done wet, the right coolant is important. . . . And change it before it becomes excessively dirty. . . . Consider feeding coolant through an open-structure wheel. . . . Try a coolant filter to produce high finishes.

Avoid: Haphazard lubrication of machines. . . . Vibration in spindles. . . . Temperature extremes in wheel storage rooms. . . . Coolant tanks being filled with sludge, or the finish will be poor.

Milling—When milling steel, try negative-rake carbide cutters for faster feeds and speeds. . . . Use automatic work loaders on production jobs to reduce cycle time. . . . Air clamps in work fixtures can cut cycle time by as much as two-thirds.

Remember the greater the feed per tooth, the more efficient is the metal removal. . . . With ductile materials, use rake-tooth cutters if possible. If cutter digs in, reduce the rake.

Check the tooth load and stay within recommended loads for cutting-tool material. . . . Establish a system whereby cutters always are ground with correct cutting and clearance angles. . . . Remember that in face-milling light alloys, you can do it at less cost by using special cutters with fewer inserted teeth.

Turning and Boring—Look for chances to raise speeds and feeds. . . . Try a better coolant, possibly sulphurized oil, lard oil, or air blast. . . . Employ multiple cuts. . . . Set up jobs so one operator can run two or more lathes.

Try changing materials. In one case a crankshaft originally turned from bar stock is now forged, and the machine-time saving is 4 hr. . . . Have standard tools ground and lapped to exact specifications. . . . Try clamped-on carbide toolbits because they permit use of a harder grade of carbide and you buy only the bits.

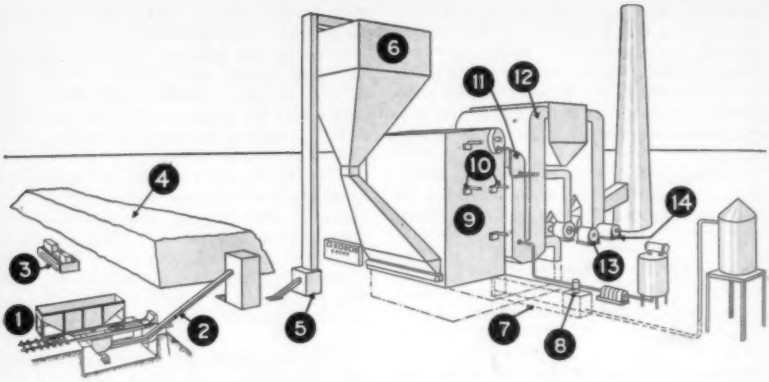
Look to attachments for time saving. An automatic mechanical feed for bar stock saves labor and keeps the machine running. . . . For moderate production or frequent change-overs, you can get good results with a universal fixture with interchangeable locators.

Tooling—Check for easy, fast loading and rapid, positive clamping. . . . Keep your jigs and fixtures light in weight if they must be moved. . . . Allow adequate chip clearance and provide for lubricant at the cutting point.

Whenever possible, use swivel or sliding jigs, dial plates, or feeding devices to reduce machine downtime. . . . Provide

balances to take tool, part, or fixture loads and reduce operator fatigue. . . . Establish standards for tool elements and use standard parts to cut inventory.

Try to design fixtures to handle several parts. . . . If carbides are to be used, make the fixture more rigid. . . . Compare jig advantages with those of hole spacer, profile follower, or similar devices.—Am Mach, Oct 6, p89



How To Cut Steam and Power Costs

POWER SERVICES vitally affect production and costs all the way from farm, forest, and mine—through factory, transportation, and service industries—right to the home of the consumer.

Chances to reduce power costs are many—importantly in steam and power generation, but also in their distribution, operation of engines, mechanical-power distribution, air conditioning, heating, refrigeration. Both maker and user of power are responsible.

Steam Generation—Cost of steam is kept down primarily by reducing fuel and other operating expenses. But errors in plant design can so limit its capacity that the load cannot be carried without adding equipment or switching to a more expensive fuel.

Major operating savings are made by burning a cheaper fuel and consuming less fuel energy. The first is a matter of fuel selection. The second depends on complete combustion with minimum excess air, plus clean heat-transfer surfaces, tight boiler settings, and tight baffles.

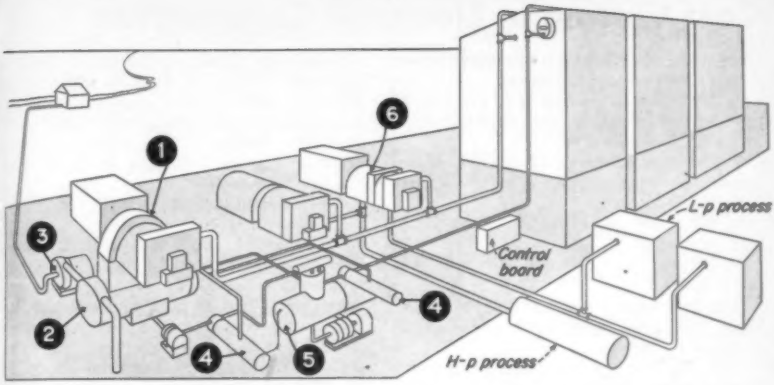
Fuel flexibility designed into a plant is well worth its cost. That means that all handling and burning equipment must be large enough to carry a full load continuously with any fuel economically available in the area.

Fuel (coal) receiving (1), conveying (2), and storage (3) equipment must be examined as to their efficiency. Will bulldozer, carryall, or drag scraper speed your coal handling and reduce labor cost per ton moved? Is the coal packed properly to exclude air circulation? A good safety idea is to install thermocouples to detect any temperature rise in the coal pile (4).

All coal should be weighed (5) and records kept on consumption. Hand firing is obsolete. In stoker firing, chute from bunker (6) should spread coal evenly to improve combustion efficiency.

Ash hoppers (7) should not leak air into furnaces. A cheap ash disposal system in small plants is to blow ash to a silo (8) and discharge to truck.

Furnaces (9) should be large enough to meet demand. Their shape should permit complete combustion before gasses contact convection heating surfaces. Me-



chanical soot blowers (10) insure clean tubes and low-cost soot removal.

Good economizer (11) operation permits higher efficiency. Soot deposits, corrosion, and scale can raise maintenance costs and offset fuel-saving advantages. The same is true for airheaters (12). A desirable test here is to see how far fluegas temperature can be lowered without moisture condensation.

Fans, forced-draft (13) and induced-draft (14), should be big enough to handle any fuel and load encountered. Power saving may be possible here by use of variable-speed drive or hydraulic couplings.

Power Generation—Efficiency of a turbine room is largely built in by the designer. There are fewer chances here to reduce operation costs than in the boiler room. But the difference between good and bad turbine or engine operation can mean a lot of money.

Good housekeeping and maintenance affect costs vitally. They are insurance against shutdowns with resulting production loss in the factory.

Great savings are often made possible by byproduct power generation. Basic idea is to reduce the waste of exhaust heat to atmosphere or condenser. Where space heating and process cannot absorb all exhaust and bled steam, remedies may include higher throttle pressures and temperatures.

Here are specific suggestions. For turbines (1), specified starting procedure should be followed to avoid costly damage. Steam conditions must be watched. Too low pressure and temperature reduce efficiency, too high endanger equipment.

All joints in main condenser (2) must be kept tight to get maximum vacuum. Tube surfaces should be kept clean by plugging, chlorination, or any other economical method. Circulating-water pumps (3) should be run at most economical speed for each turbine-load and water-temperature combination.

All non-condensable gases should be vented so heaters (4) will work at full capacity. Chemical cleaning of heaters avoid fouling and leakage. Evaporators (5) too must be kept clean to maintain evaporating capacity.

On extraction turbines (6), steam flow to condenser should be as small as possible. When low-pressure steam demand exceeds that available from low-pressure extraction point, excess can be bypassed from boiler through a reducing valve.—Power, Oct. p71

Cost Cutting in Electrical Construction

COST REDUCTION in electrical construction it attainable in several ways:

1. Management policies and methods to standardize, simplify, and expedite office and job procedures.

2. Discrete selection of materials and apparatus with reference to use values and installed cost.

3. Skill and ingenuity in job methods and practices.

4. Effective use of tools to supplement labor skills.

The following are specific, tested ideas that will put these four cost-cutting methods to work.

Job Schedule—Effective job management depends on good scheduling of materials and manpower. Differing time elements involved in procurement and overlapping of different elements can be planned and followed up on a comprehensive job schedule. Vertical lines mark off days, and horizontal lines the operating portions of the job.

Working Drawings—Project plans are rarely detailed enough to use as working drawings. So the latter should be prepared to show all conduit runs, conflicts with other structures, different wiring systems.

Job Expediting—Telephone access to home office, warehouse, and suppliers is essential. Of equal importance is an intercommunicating system on the project itself—telephone system or even a radiotelephone system on projects covering large areas.

Thin-wall Conduit—Electrical metallic tubing offers installation economies. It is lightweight, needs no threading, uses pressure of crimp-type couplings and connections.

Rolling Scaffolds — Nearly mandatory on most electrical construction jobs is one or more rolling scaffolds that can be dismantled and reassembled. Construction should allow modification to meet varying work conditions.

Fastening Tools — Clamp-on devices and spot welding of brackets offer installation economies over former technique of punching and drilling structural steel members. Inserts can be driven into concrete with power-actuated tools; no slow drilling is needed.

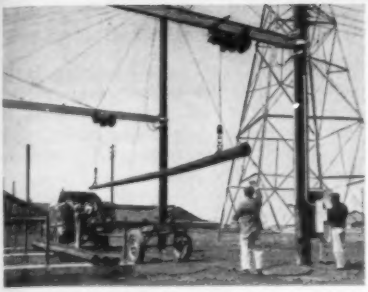
Pulling Conduit in Ducts — If necessary, conduit can be pulled in underfloor covered ducts with conventional steel-cable winch and power unit. Cable attachment is made by standard conduit coupling with pipe plug and eye-bolt assembly. It avoids cutting through concrete floors along duct length.

Local D-c. Supply—Spot conversion of ac. economically solves d-c. supply problem where it is needed on specific production machines. Rectifier plugs on bus duct and small rectifiers mounted on the machine itself provide current for magnetic chucks on grinders and d-c. motors on machine tools.

Power-Factor Correction—Low power factor is a prevalent cause of increased electrical losses. It is corrected by avoiding no-load or partial-load operation of induction motors and by adding capacitors to system. Result is increased utilization voltage, reduced line losses, increased feeder capacity.

High-Voltage Distribution—High-voltage primary distribution and short secondary circuits provide means to keep full-load losses of an electrical system at an absolute minimum. In general, 4,160 and 13,200 volts are recommended for primary distribution, and 460 volts for secondary circuits.

Power Plug-in Systems—Best secondary-distribution flexibility is provided by (1) plug-in busways that permit branch-circuit tap-offs at about 24-in. intervals and (2) trolley ducts that provide continuously available access for stationary or trolley-type connections. Installation is inexpensive, and systems are salvageable for reuse.—Elec C&M, Oct, p41



LINE POLES can be handled cheaply, quickly by two electric hoists traveling on two I-beams 18½ ft. above ground.

SAVINGS of $1,000 per mile are effected by reel tension sled in stringing lines as three sleds require only one tender.

More Tips on Cutting Electrical-Power Costs

Facility arrangement is important if manpower is to be most effective. An example is centralization of control in power plants.

Five cents per ton is a typical saving from use of earth-moving equipment to store, shift, and reclaim coal as compared with massive trestles, cranes, and trackage. Scrapers and bulldozers also compact coal to reduce danger of spontaneous fires.

Capacitors can do almost everything synchronous condensers can do—and at a lower cost. But sometimes capacitors lack the required characteristics.

Aluminum sheets (7 mm.) formed into tapering cones are Norway's prospective answer for less expensive 75-ft. transmission towers.

Time and manpower can be saved by using color-coded wire in switchboard wiring because each conductor can be traced readily.

Pipe-line cathodic protection is usually designed on a 10-year life for magnesium anodes and 20-30 years for zinc anodes. Installations cost less than 1% of the value of a gas distribution system.—Elec World, Oct 22, p97

TURBINE REPAIRS are made easier and less expensive at Dayton Power & Light Co. by this home-built tool. It bores shell prior to installation of new inserts in diaphragm ledges. Arm holding carbide tool turns at 4 rpm. It is adjustable parallel or at right angles to turbine axis. Use of tool reduced outage time to 7 weeks instead of 5 months.

Three Steps to Cut Textile Costs

INEFFICIENT TEXTILE MILLS are falling behind their competition—even closing up—because costs, which were minimized in importance during the war in favor of production, have not been brought into line. Other manufacturers have faced the cost problem squarely and are getting results. Cost reductions from 10–75% have been reported to *Textile World* by various segments of the industry.

Putting in a new blending-picking system in which one man does the work of four cut costs 75% . . . A New England woolen and worsted mill installed conical rings on spinning and twisting frames and cut waste 10–20%. . . Centralized lubrication saved 33–50% of the oil formerly used on 419 spinning frames . . . Weaving efficiency of 80 looms was raised 10% and seconds cut 13% by adoption of a new type size. . . Moisture-content control system raised cotton mill production 22%.

These are but a few of the results of current cost-cutting programs.

To many hard-pressed mill managers, the answer to high costs was a 10% slash across the board. After the cut, many found costs were the same, some higher.

Other managements adopted a 3-step program to lower costs. The program called for no dismissals, elimination of no operations or services. The plan steps were:

- Enlisting all management personnel in the cost-cutting effort.
- Briefing operating executives and supervisors on a practical approach to cutting costs on the departmental level.
- Getting the rank-and-file participation in the campaign.

The size of the mill has little effect on success of the program. Changes should be a tailoring job to fit the plan to plant size rather than a redesign job.

Step I—Selling the program. It is highly important for all of management to see the entire picture. A major obstacle to any cost-cutting program is the belief among lower-level management personnel that cost cutting lies solely in the province of top management. This belief must be overcome. All must be brought into the program.

Meetings must be held—either one large or several small. Size of staff is the determinant. Staff must be told of the demand for your product; of computing products, their price and competitive advantages; effect of shrinking markets and heightened competition; effect of continued high cost levels.

Step II—Create specific goals. The first step has made clear the need for action and established willingness to cooperate. Step II bridges the gap between willingness and action.

The management group is divided into divisional groups. Middle-management levels must be included. It is middle-management's job to put across the operational basis of the cost-cutting plan.

Costs inevitably include a certain amount of excess or unnecessary expense and it is possible to get better results from present equipment and materials. Elimination of waste, both in input and output, is the best way to cut costs. That is waste of effort, material, talent, time, money.

Each type of waste should be accompanied by examples—unnecessary handling, such as placing packages on table prior to placing them in trucks; spoilage of a cut of cloth by permitting a single dirty bobbin to be run; using highly paid operators for low-skill tasks.

Step III—To get maximum benefit from the program, cost cutting must be taken down to all workers. To do this successfully means making it easy for the employees to think the program through. Being overly familiar with his job, it is hard for an operator to think about that job in abstract terms.

Specific questions will aid him in study-

ing his job objectively. Are we doing any work that may have been required once but is now no longer necessary? Are we duplicating work that is done elsewhere? Would different tools or equipment make a job easier?

Management that can get these answers from employees and then put answers into operation has taken a long step toward high productivity at lower costs.

Overseer Is Key in Textile Cost Cutting

An alert, conscientious overseer can do much to effect lower costs within his department. Intimate knowledge qualifies him, above all others, for applying cost-cutting fundamentals.

One overseer claims there are only six vital factors to consider in running a department: direct and indirect labor costs, total cost, ratio of indirect to direct costs, total units produced, and labor costs per unit.

Payroll analysis with this information makes comparison between standard and actual costs easy. It warns of increased indirect costs and gives information necessary to locate cause of the increase.

Overseers find that if standard production per machine is maintained, direct labor cost takes care of itself. Partial departmental curtailments are often difficult to prevent. When it is unavoidable, it is more economical to shut down a large number of machines for a short time than a few machines for a longer time.

When process is piecework, labor-cost increase may be slight on direct labor but indirect-labor costs may rise sharply.

Alert overseers find control of the amount of waste a major step in cost control—both processing and rework. Some savings show up directly, others are less evident. One overseer found that a 2% reduction of laps and lap waste was equivalent to a 2% reduction in picker payroll.

Materials Handling

Since materials handling is about 40% of cloth manufacturing costs, it is a good point at which to start cost cutting. Each ton of finished cloth represents about 20 tons of materials moved—handling from receipt through processing and distribution.

When checking handling costs, hidden costs are often overlooked. These include old-age benefits, workman's compensation, paid vacations, nonproductive time, payrolls, etc. Accountants estimate that hidden costs represent 40–50% of manual handling costs.

Safety is often a direct benefit from mechanical handling equipment. Mechanical lifting and moving eliminate many labor hazards. Improper handling practice accounts for 25% of the industrial accidents.

For every handling job, there are several ways to perform the task. Each possibility must be checked thoroughly as to cost and results expected.—Textile World, Nov, p103

How Overseers Can Cut Textile Costs

- Put hank clocks on pickers, paying tenders by piecework.
- Eliminated one drawing operation for a 32% cut in drawing costs.
- Standardized machine speeds to raise production 9%.
- Rearranged job elements of all jobs taking less than 60% of operator's time. Saved: 26% of time to open cotton bales.
- Installed vacuum-strippers to cut card labor costs 17%.

How To Achieve Lower-Cost Designs

INCREASING COMPLEXITIES of modern design demand the services of a new group of engineering specialists. Glenn L. Martin Co., manufacturer of airplanes, calls them design cost-control engineers. They collaborate with the designers to develop economical design procedures and techniques.

Their work is based on this premise: The most efficient manufacturing, tooling, planning, and purchasing cannot lower fabrication cost below the minimum established by the design.

Primary functions of such a design cost-control group should include:

1. Cost-analyze engineering designs and initiate production design principles to obtain the most economical design decision for manufacturing.
2. Promote cost control by issuance of design cost bulletins presenting design cost-reduction procedures.
3. Develop the standardization of designs for economical manufacturing.
4. Initiate and cost-analyze new manufacturing procedures.
5. Encourage and develop a cost-conscious attitude toward design.

Accept as Good Investment

A manufacturer should not rush blindly into design cost control. He should accept it as the good investment it is. It takes time and money. But Glenn Martin has found for last year's activities alone there is indicated a savings of $1,600,000 as compared to its manpower cost of $30,000.

At this plant, the design cost-control group functions in a consulting capacity through the production design section. It is divided into two units.

The first unit is composed of design cost-control engineers located in the various design and department sections. It is primarily responsible for providing "on-the-spot" design cost information. These engineers cooperate with design engineers to achieve economical design releases for manufacturing.

The second unit consists of cost engineers. It is responsible for basic development of standards, such as cost bulletins, cost conversion factors, time data, and basic analyses. It furnishes the design cost-control engineers with supplemental data and helps evaluate comparative costs analyses.

Specialists Must Be Trained

Design cost-control engineers cannot readily be hired as such. They must be trained. Qualifications are:

1. Fundamental knowledge of engineering principles and the ability to originate practical design improvements.
2. Specialist in application of production design principles and solution of producibility problems.
3. Excellent judgment in use of standard time data per operation and labor cost factors to cope with variables in development of cost analyses.
4. Ability to understand cost accounting in use of wage rates, burden charges, cost procedures.
5. Thorough knowledge of all machines and tools required.
6. Ability to write reports and make understandable recommendations for cost developments.
7. Good mathematical ability to develop cost factors, quantity cost curves, and records of design costs.
8. Aptitude for presenting visually the development of cost breakdowns and design simplification principles.

As far as the actual design cost-control procedure itself is concerned, it operates in three steps. First step in the analysis of different possible designs is to develop material costs. The next step is to develop the manufacturing cost, and the third is to compute tooling costs. Thus obtained are the comparative total manufacturing costs.—Prod Eng, Sept, p81

BEFORE—Operator had to reach over conveyor leading from capper to sealer, then pivot to put milk bottles in case

AFTER—There is no more "bridging" and less fatigue as capped bottles cross case conveyor at left of operator

Work Simplification in Food Processing

BEFORE—Raised billing machines and files on revolving cabinets slowed and tired operators at order desk

AFTER—Billing machines are depressed to table level, files revolve, and operation is 25% better.—Food Ind, Oct, p46

BEFORE—Ice-cream packing was slow and unhandy because operators had to put filled cartons on badly located conveyor

AFTER—Relocating filling spout over conveyor leading to hardening tunnel streamlined task, raised production 29%

Dual Role in Cutting Coal-Mining Costs

CUTTING COSTS IN COAL mining is a dual role of top and operating management. Responsibilities are both dual and separate. If top management fails to provide the right tools and facilities, the operating department cannot function at maximum efficiency. But modern tools will not yield maximum production if improperly used at the face.

The job of top management is to set the goal and provide the tools, facilities, and management knowledge to achieve those goals. Major ways that top management can function to attain low cost and high quality are:

Equipping for Efficiency—It is management's job to spend money. Wise investment in equipment and facilities can increase productivity and thus cut costs. A guide to how much to spend is provided by careful analysis of the cost of adding a man to the payroll. This includes wages, benefits, housing, transportation (to and within the workings).

Direct and indirect costs involved in adding a man now costs about $7,000. Coal operators feel that it is safe to invest $35,000 in machinery to avoid the cost of adding a man to the payroll.

Anything that reduces hand work will keep costs down. Mechanical mining machines have cut costs in the past. They will do so in the future. Capacity is the primary factor in selection. If 10-ton trucks are used where 20-ton units might be used, the effect is to double driver wages.

Equipping for Quality—Both volume and quality production are important in the cost picture. Good preparation is essential. Mechanical cleaning equipment can reduce picking costs and improve product quality. Increased coal recovery is another path to cost cutting. There are three major opportunities for recovery improvement: (1) recovery and treatment of fines, (2) recovery from pickings or rejects from cleaning equipment, and (3) salvaging coal from mine rock and road cleanings.

Top Management

1. Wise investment in equipment
2. Providing good working conditions
3. Building a skilled staff
4. Developing markets

Operating Management

1. Maintaining efficient producing facalities
2. Keeping methods in step with equipment
3. Providing services for maximum efficiency
4. Fostering willingness to work
5. Training for higher productivity
6. Stimulating cost-cutting ideas
7. Providing incentives to produce

Improving Working Conditions—A crew working in clean, healthful, comfortable surroundings is the more efficient crew. By insisting on safe, comfortable working conditions, management takes a big step toward lower costs.

Staffing for Efficiency—Management's first job is to provide men with the necessary technical skills for supervisory roles. But it can go farther by increasing the number of skilled men in the mine and providing opportunities for acquiring greater technical knowledge after entering the field. Management must foster pre-industry training for future employees and continue their training on the job.

Building Markets—Volume is a key to low costs. Volume can be built only by expanding markets, good merchandising practices, and good service. Management should study carefully its market and factors affecting it, conduct research to expand markets, and insist on the best merchandising methods.

Operating management's responsibility is to get the most benefit out of facilities provided, to keep abreast of new developments in methods and equipment, to make recommendations for expenditures.

This is true of operating management down to and including face bosses. Basically the job is:

Equipping for Results—Operating management must keep abreast of the latest developments in its field and keep top management informed as to these developments. But obtaining high-productive machinery is only the beginning of its responsibility. Proper use of this equipment is even more important.

Low-Cost Methods—Seam, top, bottom, and grades limit the mining plan to some degree. But general rules can be formulated for lower-cost mining. Retreat operations, either full or by working sections, normally result in lower costs. Troubles are left behind in retreat operations.

Increased percentage of extraction naturally lowers cost. It spreads the cost of development and installation. Savings usually exceed substantially any added cost resulting from added timbering and other work necessitated by the pulling of pillars. Tonnage per cut has a direct bearing on equipment moves and cycle interruptions. Wider places and deeper cuts are answers.

Service for Efficiency—Service is perhaps the most important factor in loader and per-man results and in turn costs. Good service includes voltage at the face to nameplate ratings on machines; face preparation that insures adequate car supply; trip-changing methods and equipment; good track, adequate locomotive equipment; good maintenance loading and auxillary equipment; adequate sup-

(*Continued on* p A-22)

Combating Rising Costs in Iron Mining

MOUNTING WAGES and supply costs in its underground and openpit iron mines forced Cleveland-Cliffs Iron Co. to look closely at costs. Of vital importance was getting underground costs down to a point where ore could sell competitively with ore mined by the openpit method.

Pursuit of improved practices starts with exploration and continues right through development and mining. Most impressive in Cleveland's cost-cutting program has been its effect on mining methods, notably the development of blockcaving in soft-ore mines. Another has been the adoption of tungsten-carbide bits for drilling in hard ores.

Effective use has been made of long-hole, ring-drilling in stopping soft ores, with percussion drills, jointed rods, and steel bits. Holes up to 60 ft. are used and benching is eliminated to increase ore breakage and improve sub-level safety.

Steel sets and reinforced concrete lagging have replaced wood sets. Shaft mucking has been mechanized through use of a clamshell bucket. A system of incentives has been adopted to provide equal opportunities for higher earnings under several mining methods.

In exploration work, holes were drilled to vertical depths of 3,000 to 4,000 ft. but few ore disclosures were made above 2,000 ft. To cut these exploratory costs the company follows these means:

1. Wedging branch holes off from intermediate points of the parent hole, where additional information is wanted about ground within 150 to 200 ft. of the latter, instead of drilling additional holes from the surface.
2. Wedging to keep hole vertical.
3. Use of weighted rods, with pressure gages, to keep correct weight on bits.
4. Drilling by instrument to minimize blocking of the bit.
5. Reducing time required to lower bits by use of a tall steel tripod or derrick.
6. Using bits having substitutes for diamonds, such as tungsten-carbide where loss of bit appears imminent or in rough ground.
7. To improve core recovery, different core barrels have been used.

Steel sets are favored as more econom-

ical for ground support than wood timbers under proper conditions. First cost of steel is high—a 9-ft., 3-piece section costs $20 as compared to $10.50 for a similar length of untreated round hard maple—but the cost of erecting them is low. Steel can be erected in half the time of wood sets. Also one-third the excavation is necessitated with steel sets for the same inside dimension.

Steel for Transfer Drifts

There would be no economy in using steel sets for transfer drifts under stopes where treated timber will last longer than the two or three years the drifts will be in use. But for permanent main stations or haulageways or whenever fireproofing is desired steel sets are advantageous and cheaper.

Substitution of carbide bits used with Jack leg-mounted jackhammers for the steel bits used with heavy drifters has increased footage steadily. Average footage per bit has risen from 151 ft. to 349 ft. Bit cost per foot was about 4 cents less than with detachable steel bits, a saving of 50%.

Two miners drill, blast, and scrape their own ore. The incentive system extends to both men, not just the contract miner.

Carbide Bits for Hard Ore

The use of carbide bits in hard-ore mining has resulted in greater drill speeds and bit life and has cut costs per foot of drilling. Incomplete data indicates that there has been a reduction in powder costs, compressed-air costs, bit-sharpening costs.

In block-caving, space for the preliminary development of the block was cramped, owing to footwall slope. Three grizzly drifts on 3-ft. centers with two transfer scraper drifts, 60 ft. center to center, served the block. Transfer drifts were driven at the top of the haulage drift timbers to save height.

Vertically the transfers and grizzly drifts were 30 ft. apart. Finger raises were driven to a point 22 ft. above the grizzly-drift floor and were coned at 45° to receive undercut ore.

It is estimated that over 90% of the available ore is drawn.

With the possibility of having to go to depths of 3,000 to 4,000 ft. for future production research on deep development methods is progressing. The problem facing the company is whether it is more economical to strip-mine and and beneficiate two tons of ore for every ton of product or to plan for additional deep mining. Research will answer the question.—Eng & Min J, Nov, p96

Dual Role In Coal Mining

(*Continued from* p A-21)

plies at points needed; good ventilation and pumping.

Fostering Work Willingness — Men who like their jobs, bosses, and companies produce best. How to build this friendly, cooperative spirit among workmen is well known. It is only necessary to apply the rules.

Training for Efficiency — Informal training in the course of daily work is equally as important as formal "classroom" training. Training is necessary to keep a steady flow of supervisory-type personnel available for the future. All men may not want training and others may not benefit by it, but it must be available for those that desire it and can be helped.

Stimulating Ideas—An idea can originate anywhere. It is not necessary to offer formal rewards to generate ideas. A boss who listens to workers' ideas, who shows confidence in their ideas, who gives credit to the originator of the idea can go a long way toward bringing in constructive ideas from the man at the face.

Providing Incentives—These too do not need to be monetary. Posting crew and shift records, praise for a job well done, a personal word from the boss in many cases is the incentive for better work.—Coal Age, Oct, p70

Check List of Office, Warehouse Costs

EVERY DISTRIBUTOR is faced with high costs. Your office and warehouse are a good place to start cutting. Close to 80% of the distributor's costs are for wages and salaries. The job is to get work done with fewer man-hours or to get each employee to do his job more efficiently.

Savings through mechanization should be studied. Duplication should be eliminated. Back tracking, overlapping, duplication should be stopped.

The following check list shows how costs can be cut in these two all-important phases of the distributor's operation:

In the Office

1. First you must determine what costs are and which are out of line.

2. In breaking down office and accounting expenses, concentrate on the significant items and make the breakdown detailed.

3. Benefit and responsibility should determine where expenses are assigned. If a department is partially responsible for a cost, it should be charged proportionally.

4. After costs have been classified, two other facts are necessary: cost per invoice line and cost per dollar of sales. The former is valuable in measuring office and accounting and is used in conjunction with cost per dollar of sales to great advantage.

5. Cost report should be completed as soon after the end of the month as possible. It should be compared with the same month of the previous year. Monthly check permits quick location of unfavorable conditions.

6. Analyze the task of each employee. Work flow should be the determinant for assignment of work.

7. Job standardization minimizes dependence on the individual and results in smoother operation during vacations and absenteeism.

8. Check office equipment to see if it is modern. Some offices are too small to take full advantage of new office equipment. But many that are do not do so.

9. Study layout from the standpoint of work flow. Make sure each piece of equipment is in the place that requires the least amount of lost time and motion.

10. Correct lighting and color (mentioned previously in this report) are just as important to office efficiency as they are to plant productivity.

11. Many forms now in use are out of date. Forms should be studied with the idea of eliminating unessentials in printing, carbons, paper, and obsolete data.

12. Assist your personnel to keep abreast of current trends in office procedure. Training does not end when the employee is hired.

13. Frequent review of stock records is the only way management can take full advantage of quantity buying or freight allowances.

14. Traffic practices may be causing higher costs. Check such practices as routing of incoming freight, shipments, carting, unloading, weighing, handling of claims, transportation insurance.

In the Warehouse

1. If you have no warehouse supervisor, appoint one. Someone must be responsible for activities, elimination of duplication, coordination, and integration of the warehouse operation with other operations.

2. Space allotments must be studied for individual products or lines. Match results against actual space allotments.

3. Prepare a drawing of the warehouse. Are receiving and shipping in the most advantageous spots? In most cases, the two should be separate. Make sure aisles are wide enough to permit easy flow of materials.

4. Keep overstocks as near to the bins holding regular stocks as possible. All overstocks should be centrally located if

they cannot be kept in bins along with regular stock.

5. Physical movement of stock should be kept at a minimum. Movement means costs. Fast-moving or heavy, bulky items should be kept close to receiving and shipping locations.

6. Materials-handling equipment should be checked. Is the type you are using the most advantageous type you could use? Equipment nearly always is advisable.

7. Average time to perform each warehouse task must be determined, otherwise your warehouse operates in peaks and valleys. Make definite job assignments and alternative assignments. This will level out the peaks and valleys.

8. If your warehouse is in an old structure with high ceilings, are you making best use of the available space? Often balconies will permit use of upper space.

9. Color, as in the office, is important. So is lighting. Don't neglect either.

10. Warehousemen will be aided in their jobs if others do their jobs better. Write orders legibly. Use standard terms known to the warehouse personnel. If warehouse-order copies are carbons, make sure they are not smeared.—Ind Dis, Oct, p81

94 Pages on Cost Cutting in 1949

Cost cutting is not new to the *McGraw-Hill Digest*. During 1949, it brought you 41 articles totaling 94 pages on how to cut costs. For your reference:

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TRANSPORT HELICOPTER

Under development for the USAF, Army, and Navy, this Piasecki XH-16 helicopter transport is scheduled for completion this year. Fuselage of the two-engine craft is the size of a DC-4. Pod is about 40 ft. long, may be standardized with that of the C-120. Craft is all-metal.—Aviation Wk, Nov 7, p15

Magnetic Drive Controls Mill's Air Conditioning

New air-conditioning system of Wiscassett Mills Co.'s ladies' hose plant controls temperature and humidity. Temperature of water supplied to wash the air is held within ½° F. of selected value.

This close temperature control is made possible by use of a magnetic drive between motor and compressor. This is an adjustable speed method that has been applied widely for speed control of boiler draft fans in power plants.

Load characteristics of centrifugal compressors and fans are similar. A characteristic of both applications is that load torque varies as the speed squared. Transmitted torque and output speed are accurately controlled, therefore, by varying field-coil excitation.

The textile-mill application employed an Electric Machinery 150-hp. magnetic drive with a speed range of 353–1,735 rpm.—Power, Nov, p82

Studies Molten-Steel Flow

Certain important observations on metal flow in sand molds have been made as a result of a motion picture produced by Armour Research Foundation. It was made on a research project for Steel Founder's Society of America. Observations included:

1. Ingates spaced equidistant from the sprue produce more uniform temperature distribution.

2. Pouring speed influences time required to cover drag surface, but flow pattern remains the same.

3. Single ingate systems cause more mold erosion than multiple ingates.

4. Smaller-diameter ingates cause most erosion, regardless of gating system.

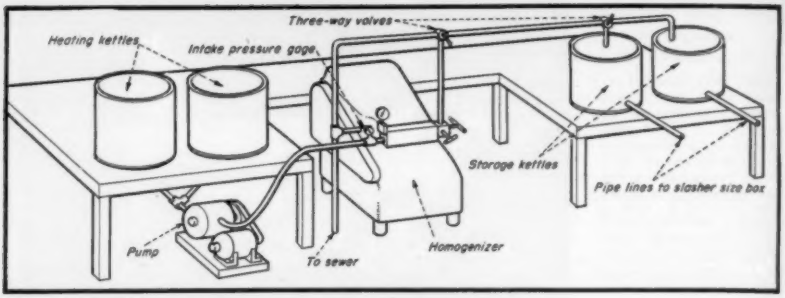
5. Fast filling of the mold with low-velocity ingates tends to produce plate castings with minimum of erosion.—Foundry, Nov, p118

Hydra-Matic Bus Transmission

The new 31–33 passenger GMC intermediate-sized transit bus will feature General Motors' Hydra-Matic transmission. Engine and transmission are mounted at rear. Patented "angle drive" unit permits installation without consuming passenger space.

Over-all length is just over 27 ft.; body is 94¾ in. wide; wheelbase is 180¾ in.

Body and understructure are one unit, providing girder-construction strength. The roof has aluminum center and side crown panels. The front crown panel is steel. Sides are aluminum.—Bus Trans, Nov, p71



TYPICAL HOMOGENIZER INSTALLATION shows simplicity of layout

Homogenization of Warp Sizing

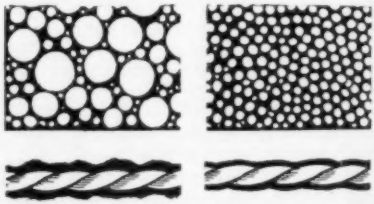
Use of homogenized solutions for warp sizing new to industry. Process produces more even particles, providing uniform layer on fiber

HOMOGENIZATION is not new to the textile industry, but current application to sizing solutions for warp yarns is new. In this newest application, size particles are broken down and distributed evenly throughout the mixture. Reduction of particles is accomplished by violent mixing, grinding, sheaving, or combination.

Homogenization permits more exact control of viscosity over previously used batch methods of size preparation. Equipment can be adjusted to produce particles of a dimension required by a specific use.

Starch mixtures for slashing have previously been prepared by boiling for long periods. This boiling caused thermal breakdown of starch particles. Homogenization reduces sizing solution without boiling, resulting in a saving of labor and steam. But other advantages outweigh these benefits.

Homogenized size particles are approximately all the same size. Size of particle, which with temperature controls viscosity, can be regulated by homogenizer setting.



DISPERSION and size of homogenized particles (right) compared to conventional solution (left). Evenness of homogenized size when applied to yarn is shown (right); boiled size (left).

Greatest advantage of homogenized slashing solution has been the maintenance of a uniform, stable viscosity. This permits an even application of size to yarn, resulting in increased weaving efficiency. Less starch can be used as homogenized size does more work—it spreads itself out more evenly on the yarn. It may even be possible to use a lower grade starch because of increased potency of homogenized solutions.

Uniformity of coating permits slashers to be run at higher speeds since less

time is needed for drying. If more moisture is needed in yarn, slashers can be run at even higher speeds. Homogenized size will not stick to drying cylinder as with standard sizing. If a higher percentage of moisture is left in the yarn, weave-room humidity may be lowered.

Total starch consumed per week is reported to be lower. The new starch can be left over the weekend without separating into a jellied mass as with conventional size.

Difficulties will be encountered with homogenized starch. Plant conditions vary. Proper application pressures vary with the type and amount of starch, type and amount of softeners, temperature of kettle and size box.

Homogenizers may soon be applied to preparation of finishing solutions, printing pastes, even dyestuffs. Fiber lubrication may be an application for the equipment. Present uses for cotton- and worsted-yarn may be applied to synthetics.—Textile World, Nov, p127

Fast Personnel Accounting

A personnel accounting system is in effect at Puget Sound Power & Light Co. Basis of the system is a personnel statistics punch card that contains all the basic information needed to show the individual's education, training, location, and job classification.

Personnel studies can be easily run quickly and accurately. For example, every quarter year a summary of sickness and disability allowances is made for distribution to the various division managers. A yearly summary also is made.

Another typical use is to publish seniority lists. Still another is to keep records of employees either of draft age or affiliated with military reserve organizations.

All such studies are made with a great saving in time over the former, inadequate system of keeping volumes of records.—Elec World, Oct 8, p112

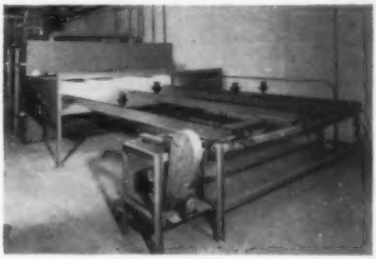
New High-Temperature Alloy Adaptable for Gas Turbine

A new age-hardenable Inconel alloy has been developed by International Nickel Co. Called Inconel "X", it is suitable for many applications at temperatures from subzero to 1,200° F. It is particularly adaptable to gas-turbine parts.

The new material can be forged without trouble. Because of its strength at high temperatures, heavier equipment is needed than for ordinary steels. Forging temperatures are 1900–2225° F. Air cooling is recommended.

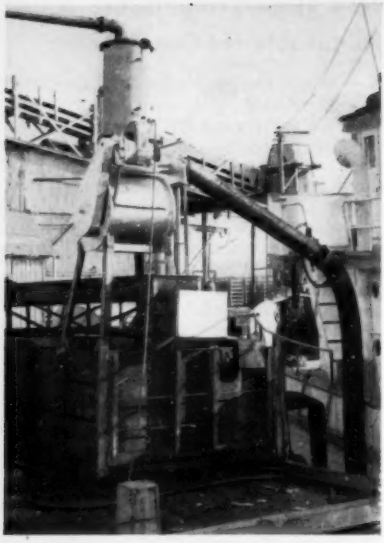
Machining is more difficult as the alloy is strong and tough. Roughing can be done most readily in the rolled, solution-treated or forged, solution-treated conditions. Heavy, sturdy machines and tools should be employed to avoid chatter.

The alloy is weldable. Metallic arc, inert gas, atomic hydrogen, and resistance seam methods have been satisfactory. In oxyacetylene welding, proper fluxes are not yet available.—Steel, Oct 31, p46



INFRARED DRIES LUMBER

Infrared kiln drying of lumber has gained Howard Industries, Inc., many advantages: moisture reduction from 14 to 7%, flexibility of heat range, small floor space needed for oven, cleanliness, low maintenance, economy, and elimination of warping. Boards are laid on conveyor cross-wise of chains. Chains are spaced to accommodate different lengths of boards (arrows). Drying time is 20 min.—Elec World, Nov 5, p100



PUMP UNLOADS SARDINES

Designed to convey fish or other foods in liquids, Kimmerle Food Pump System can transfer 50-150 tons per hr. Sardines travel up suction hose (at right) and are discharged through rotary valve to plant belt conveyor. Built by Pearne & Lacy Machine Co., system is built around vacuum pump hooked to six-chamber rotary valve.—Food Ind, Nov, p92

New Jet, Rocket Compound

A metallic compound for jet and rocket engines to withstand temperatures of 3000° F. has been developed by American Metals Corp. Metal is a zirconium-boron compound. If it can withstand high operating temperatures while simultaneously handling stresses of 50,000-75,000 psi., considerable design data showing the possible benefits through use of higher compression ratios and combustion-heat release can be practically applied.—Aviation Wk, Oct 24, p31

Antenna for TV Reception Far Below Line of Sight

Improving the television receiving installation adds miles to the effective transmitter range. This was well shown at the University of Louisville where an antenna was built to receive signals at a point 2,000 ft. below the line of sight.

The antenna is an 18-element, 3-bay, parasitic array. Each bay has 6 elements, 2 collinear driven elements placed horizontally with reflectors spaced 0.16 wavelength and directors spaced 0.1 wavelength. Collinear elements permit use of voltage feed and narrow angle of response in the horizontal plane.

Other features of the installation include a cascode preamplifier at the antenna and special design of the i-f. amplifier stages and sweep circuits. The preamplifier amplifies the signal fed to the downlead to overcome the noise in the receiver and the noise picked up on the transmission line.

Results from the antenna installation were regarded as promising. Reception from Cincinnati, about 90 miles away, was entertaining at least half the time.—Electronics, Nov, p72

Preshrinking Polyethylene

Polyethylene fabrics can be preshrunk to less than 2% residual shrinkage at temperatures up to 165° F. by a new finishing treatment developed by American Viscose Co. Preshrinking may remove the last barrier to widespread use of the fabric for auto upholstery, handbags, luggage, shoes, draperies.

New process consists of first treating fabric in a semi-relaxed state with hot water, hot air, or steam. Heat shrinks both warp and filling. After shrinkage, fabric is steamed on a decating machine to increase uniformity and flexibility. If smooth surface is required, calendering is recommended. Standard equipment is used.—Textile World, Nov, p145

Safety Problems Unchanged By Continous Mining

Ventilation and safety problems differ little over part problems in use of continuous-mining equipment. Hazards should be recognized and corrected more quickly because of the increased rate of face advance with continuous equipment.

Effective face ventilation requires an adequate volume of air sweeping the face at all times. Line curtain need not be maintained to within 10 ft. of the face to do this. Shape and size of continuous-mining equipment prevents this.

In low coal, the Joy continuous miner acts as a curtain itself. Action is less in high coal. Good ventilation is possible with a line curtain as far as 20 ft. from the face if air is moving at 200 fpm. or more as it leaves the curtain.

Roof conditions are improved by continuous mining as blasting is not necessary. But precautions must be taken. Roofs should be tested regularly, and proper number and type of supports installed. Air at face must be tested for gas at regular intervals. Equipment must be shut down during gas testing.

Problem of allaying dust before it becomes air-borne has not been solved. Tests are being conducted on this problem. Where serrated ribs result from cutting, the rock dust required per linear foot of equal-sized opening is about 10% more.—Coal Age, Nov, p94

Sound Waves Pump Oil

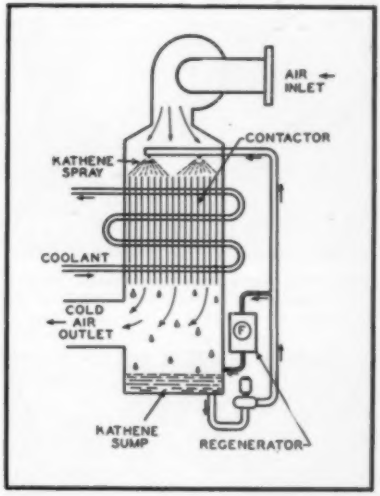
A sonic pump, which lifts fluids by means of sound waves, is now pumping oil from a California oil well. Made by Soundrive, Inc., it is currently under test.

Sound waves, generated by a sinusoidal-sound-wave generator, are sent down the tubing at 10 cycles per sec. and 16,000 fpm. They are overtones of the fundamental resonant frequency.

They cause alternate, low-stress expansion and contraction of the tube length. This small change in length moves the oil up the pipe. Check valves support the oil column as it is raised.—Oil and Gas J, Oct. 20, p125

Bonds Aluminum to Steel

A new method of bonding aluminum to steel for protection against the steel's corrosion has been developed by Reynolds Metal Co. Process involves application of aluminum foil strips to steel by a fine iron coating electrolytically deposited on the steel. Process is continuous. Following the electrolytic bath, steel is heated to 850° F. before aluminum sheets are applied.—Aviation Wk, Nov 21, p32



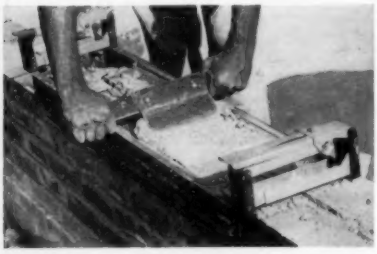
PREVENTS FROST ON COILS

Frost condensation on low-temperature heat-exchange coils is completely eliminated by Surface Combustion Corp.'s "Kathabar" system. In tests, no frost formed at —100° F. No efficiency is lost from frost formation on heat-exchanger equipment. System does not need to be shut down for defrosting. It is suitable for any cold, dry-air application.—Marine Engrg & Ship Rev, Oct, p100

Speeds Brick Laying

BRICKS are laid in proper alignment, 3000 a day, in guides of this jig. Levels are built in.

ONE SCOOP of mortar beds bricks. Second covers course with sufficient mortar to fill all gaps.



SCREED smooths, grouts mortar. Form is unclamped and reset immediately. It is a Hodgson-Sommers, Inc., development.—Cons Meth & Equip, Nov, p78

Enamel, Metallic Finishes Applied by Aerosol Can

Enamel paints and metallic finishes that are spray-applied from aerosol cans have been developed by Illinois Bronze Powder Co. (see McG-H Digest, June '49, p26). Freon is the dispensing agent.

Standard paints cannot be used in the dispenser since pigments clog the minute orifice of the spray valve. An entirely new product had to be formulated—product had to be adapted to the container, the reverse of normal.

Operation is simple. Can is agitated and protective friction lid removed. Nozzle is held 8–10 in. from surface to be painted, and rubber release button controlling valve is pressed. Can is directed from side to side. A can will "paint" a 10 x 15-ft. surface.

Paint is available in seven colors—aluminum, white, black, Chinese red, garden green, canary yellow, and light blue. Paint costs more than ordinary paint, but difference is offset by lack of brush and turpentine costs, dripping wastes, and evaporation.—Mod Packaging, Oct, p110

Reveals New Logging Method

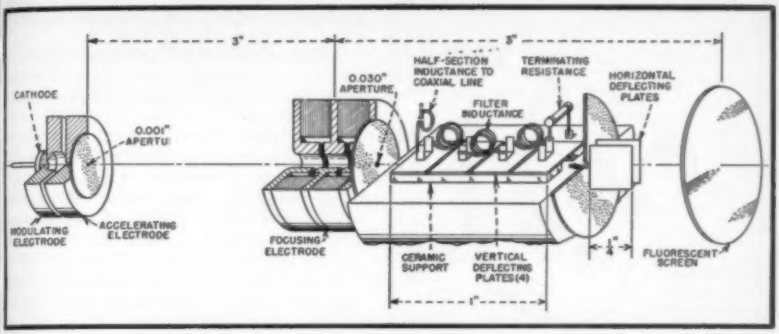
Recent developments in electric logging of oil wells promise to be revolutionary. Schlumberger Well Surveying Corp. has announced a new method that will differentiate and identify marker beds in shale formations.

Potentialities of the method fall into three groups:

1. Identification by precise resistivity measurements of shale beds and resistivity sequence of all shale beds for a specific field.

2. Location of faults, pinchouts, facies changes, or other geological anomalies.

3. Identification of the sedimentary cycle into deep-water assemblage or brackish-water assemblage.—Oil & Gas J, Oct 20, p67



TRAVELING-WAVE OSCILLOSCOPE TUBE DEVELOPED

Bell Telephone Laboratories has developed experimental 1,000-v. oscilloscope tube with almost flat frequency response of 0-500 mc. and signal input impedance of 75 ohms. Intended as general laboratory aid, it achieves performance through two means—optical magnification of pattern and a traveling-wave deflection system to get good vertical deflection without bandwidth limitation. Tube can be used for most purposes without an amplifier. Pattern is viewed through 60-power microscope.—Electronics, Nov, p97

Desulphurizes Cupola Iron in New Type Holding Unit

Intimate contact between cupola iron and soda ash promotes desulphurization. A unit installed in Worthington Pump & Machinery Corp.'s Buffalo plant provides such contact.

The desulphurizing unit is designed to hold 3,000 lb. of iron, or 1½ charges as melted. At prevailing pouring rates, metal remains in the unit about 10 min., which is long enough to allow effective contact.

Located in front of the cupola, the unit is shaped so that molten metal traverses the basin channel for a distance of 2 ft. with sharp directional changes at entrance and exit points. The changes in direction result in turbulence and better mixing.

Soda ash is fed into the unit from an elevated hopper. Feeding rate is governed by an orifice plate in the feed tube. Changing hole size varies feeding rate and percentage of sulphur removal.

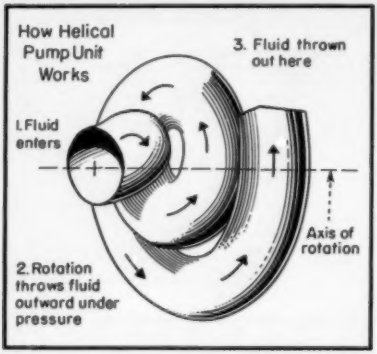
Sulphur contents as low as 0.035% have been obtained. Adding enough soda ash with this procedure should give a 0.03% content. Such low sulphur can also be obtained by double desulphurization.

Iron from the desulphurizing unit with 0.071% sulphur, for example, was given a further treatment in the ladle with dense soda ash. Sulphur dropped to 0.03%.—Foundry, Nov, p88

Introduces Three Diesels

Three new models of diesel switching locomotives have been introduced by Electro-Motive Div., General Motors Corp. They are a 1,200-hp. yard switcher, an 800-hp. yard switcher, and a 1,500-hp. road switcher or general purpose locomotive.

The 1,500-hp. and 1,200-hp. are now in production. The 800-hp. switcher will be available by late summer. The division is also producing a highspeed 2,250-hp. diesel passenger locomotive.—Steel, Oct 31, p19


How Helical Pump Unit Works
3. Fluid thrown out here
1. Fluid enters
Axis of rotation
2. Rotation throws fluid outward under pressure

***SUBSTITUTION** of a helical tube for conventional blades in Fairbanks, Morse & Co's new unit produces . . .*

Clog-Proof Bladeless Pump

Employing a helical tube in place of the conventional blades, this new centrifugal pump is practically clog-proof—a problem faced with standard centrifugal pumps. Liquid (and solids if present) is thrown outward by centrifugal force, the liquid moving through the corkscrew-shaped tube.

Tube starts at a small radius at the axis of rotation and fans outward in a helical path. Diameter of the rotating tube at its narrowest point is equal to the diameter of the inlet pipe.

Almost any solid will pass through the pump. Pump does not have to be oversized (it usually takes a 4-in. pump to pass 3-in. solids). First costs are said to be lower, as are maintenance and power costs.—Business Wk, Nov 19, p82

Treatment of Textile Waste

Avoiding contamination of streams by textile mills is hard. It is doubly hard for woolen and worstead mills because of the wool scouring and dyeing operation. James Lees & Sons Co. has just completed a carpet mill with neutralizing installations capable of handling 250,000 gal. of waste water per day.

Alkaline scouring wastes are neutralized by acid dyeing wastes. Use of filter-plant lime sludge helps to reduce plant operation costs.

Bar racks screen out fibers before water enters equalizing tanks. These tanks act as surge tanks to provide relatively uniform flow rate. Strengths, colors, and temperatures of waters are equalized in tanks. In acid mixing tanks, dyeing and scouring waters are mixed in desired proportions for neutralization. Sulphuric acid is added to crack wool grease.

In the first and second floculating and settling tanks, flock settles out and scum and sludge are removed. Acidified wastes pass to a mixing tank where acidity is neutralized by company water-treatment plant lime-sludge and hydrated lime. Ferric acid is added to assist coagulation. Secondary precipitation is collected in third and fourth settling tanks prior to discharge.—Textile World, Oct, p103

H-F. Gluing Accepted Practice

Plywood and lumber industries are finding more applications for high-frequency gluing of wood. Most current installations are for edge gluing of lumber to make wide boards from narrow strips.

Other applications are in furniture manufacture and in production of prefabricated houses. Windows, doors, and wall sections are readily made.

High-frequency dielectric heating generators are now available with power outputs of 1/10 to 125 kw. Output frequencies range from 2-million to 200-million cycles per sec.

Typical medium-power equipment draws about 35 kw. at 90% power factor from 60-cycle line, and delivers 15 kw. at 2-million to 10-million cycles to the glue lines being heated. Glue temperature rises gradually to 200° F., and glue sets in about 20 sec. without appreciable heating of wood.—Elec West, Oct, p72

Three-Step Light Maintenance Keeps Light Efficiency Up

Cleveland Graphite Bronze Co., knowing that high light output means higher productivity, maintains illumination of 30-35 foot-candles in plant areas and 40-50 ft.-c. in inspection areas by a three-step maintenance program. The company has 11,000 fluorescent fixtures—one- and two-tube units—to illuminate 560,000 sq. ft. of area. The program costs annually about $3.59 per fixture to maintain.

Two lighting inspectors, as a team, check all departments daily for flickering or burned-out tubes. Burned-out tubes are replaced. If tubes flicker, fixtures are checked for possible grounds. Red sticker indicates burned-out ballast, blue sticker a broken socket, yellow sticker a ground condition.

Shade cleaners, working on the third shift, clean every fixture every 3 months. Cleaning alone raises work-level illumination 7-10 ft.-c. Tubes are checked prior to cleaning and a date sticker affixed to new tubes. Tubes that have been in 7 or more months are replaced. This eliminates calls during work hours to replace burned-out tubes.

Work areas are checked daily with a light meter to keep illumination at set standards. In 6¼ yr. the program has kept burned-out ballasts to 100, broken sockets to 100, and repaired grounds to 50.—Factory, Nov, p110

Eliminates Altimeter Resetting

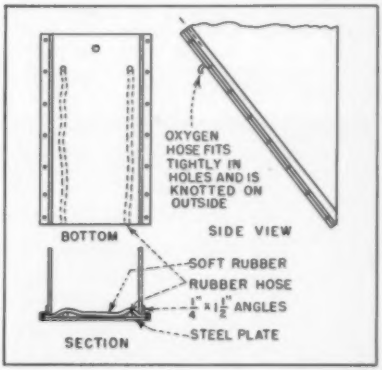
New altimetry procedure being tested by Military Air Transport Service will eliminate the need for constantly resetting altimeters during flight. On becoming airborne, pilot sets unit at standard sea-level pressure of 29.92 Hg. and maintains that setting over the entire trip.

To offset altimeter errors induced by pressure and temperature variations, pilot stays above a minimum "safe" altitude prescribed for that trip that day. MATS believes that if the procedure were adapted to all carriers, there would be less danger of mid-air crashes.—Aviation Wk, Nov 21, p26

New Mortar, Pestle Design

The first basic change in mortar and pestle design in centuries has resulted in a more efficient grinder, mixer, and emulsifier. Prescriptions can be mixed in one-tenth the time required with conventional unit.

Diameter of pestle is about the same as the radius of mortar. Both have straight vertical sides and flat bottoms. They are of porcelain, glazed on the outside, unglazed on the inside.—Pharmacy Int'l, Dec, p12



PREVENTS CHUTE HANG-UPS

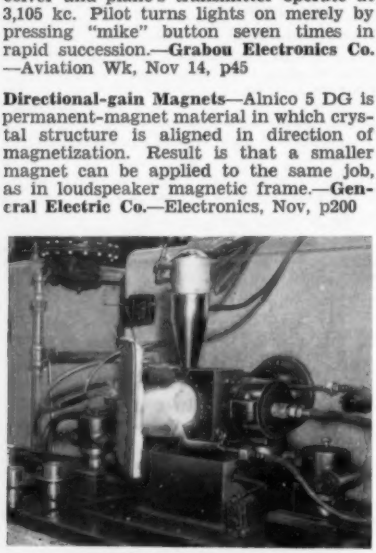
Persistent hang-ups of concentrates in a 51° steel feeding chute 9x14 ft. at Benson Mines required design of this rubber-lined chute. Bottom, covered with soft rubber is bolted on ¼x2-in. angles. Rubber was not bolted to bottom of the plate at the lower end of the chute. An air connection was welded 6 in. from the top edge of the bottom. Two pieces of rubber hose were inserted between the rubber cover to prevent rubber from lying "dead" on chute bottom. Air passing between steel and rubber vibrates the concentrate.—E & M J, Nov, p114

New Products

Retards Flame—New chemical, Erifon, gives cotton and rayon fabrics a flame resistance that withstands dry cleaning, laundering, and weathering. A solution of titanium and antimony salts, it can be handled only by textile mills.—**E. I. du Pont de Nemours & Co., Inc.**—Chem Eng, Nov, p159

Pilot Lights Runway—Pilot can light runway lights on unattended airports with light-control radio equipment. Ground receiver and plane's transmitter operate at 3,105 kc. Pilot turns lights on merely by pressing "mike" button seven times in rapid succession.—**Grabou Electronics Co.**—Aviation Wk, Nov 14, p45

Directional-gain Magnets—Alnico 5 DG is permanent-magnet material in which crystal structure is aligned in direction of magnetization. Result is that a smaller magnet can be applied to the same job, as in loudspeaker magnetic frame.—**General Electric Co.**—Electronics, Nov, p200



FLAME-HARDENS HUB

Hub surfaces of Buick Dynaflow part are flame-hardened in 22 sec. on Cincinnati flame-hardening machine. Part is held on arbor between two air-operated heads having gas jets in faces. When surfaces are up to hardening temperature, as determined by Leeds & Northrup Rayotube above part, heated piece is ejected to quench tank.—Am Mach, Oct 20, p71

Speed Floor, Roof Construction—"Durisol" soffit blocks—cement and mineralized wood shavings—provide integral forms for reinforced concrete and become part of the ceiling or floor. Blocks are 24x48 in. in 7½, 9½, 11½ in. sizes to form 6-, 8-, and 10-in. joists. They are fast to place, lightweight, provide excellent plaster base, and form good thermal and sound insulation.—**Durisol, Inc.**—Eng News-Rec, Nov 10, p136

Plastic Storage Trays—Visibility and compact storage are combined in transparent plastic storage trays for small parts. Steel shelves measure 34½ x 14¾ x 11⅝ in. and accommodate up to 56 trays. Trays are of two sizes and are fitted with four removable partitions. Specification index cards fit into slots at front.—**Andrew Technical Service**—Factory, Nov, p152

No Ditch Digging—Earthworm boring machine permits laying all types of pipelines up to 3 in. in dia. and 150 ft. long without breaking ground surface. Accuracy is within 1 in. of target in 150 ft.—**Lube Jack Co.**—Oper Eng, Nov, p66

Flexible-shaft Machine — Kellerflex can handle wide range of work and be mounted on floor, bench, or by suspension. Two speed ranges are available: 1,000-6,000 rpm. and 2,000-12,000 rpm.—**Pratt & Whitney, Div., Niles-Bement-Pond Co.**—Iron Age, Nov 3, p40

Breaks Heavy Loads—Model HCL safety switch has new arc-quenching design and actuating mechanism that permit breaking heavy loads safely and quickly. Magnetic repulsion action aids arc quenching. Switch sizes are 30, 60, and 100 amp.—**Trumbull Electric Mfg. Co.**—Elec West, Oct, p52

Continuous Washer—Continuous tensionless cloth-scouring machine, designed to cut labor and production costs, processes worsted cloth from gray room through fulling, scouring, extracting, and drying with only three hands. Rate is 50-60 yd. per min. Units are available with from 7-9 bowls. Water consumption is only 6-8 gal. per lb. of clean cloth.—**James Hunter Machine Co.**—Textile World, Nov, p166

Straight-side Presses—New line of straight-side single-crank and double-crank presses has interchangeable parts among different sizes and types. Presses have box-type crowns and slides, as well as barrell-type slide adjustments which permit accommodation of dies varying in height.—**E. W. Bliss Co.**—Am Mach, Oct 20, p128

Counts, Marks Tickets—A "Tickometer" counts and marks up to 1,000 tickets per min. An optional imprinting device permits dating, coding, indorsing, or canceling during the counting operation.—**Pitney-Bowes, Inc.**—Railway Age, Nov 5, p53

Controls Street Lights—Groups of street lights in series or multiple systems can be turned on and off by model "PR" photoelectric relay control. It can be set to operate from few minutes to 20 min. after sunset.—**Tabet Mfg. Co.**—Elec World, Nov 12, p29

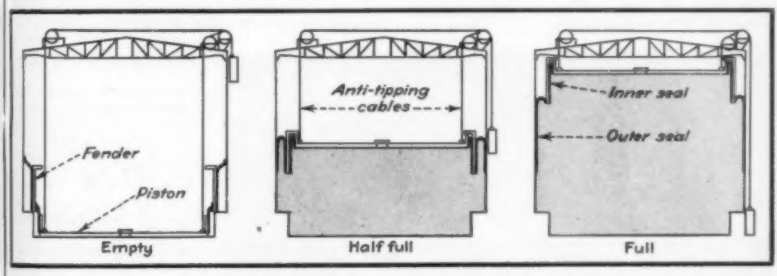
Drills Blast-holes Faster—Increased drilling speed with lower cost per foot drilled are chief advantages claimed for a new rotary drill rig. Drill pipe consists of 10- and 20-ft. lengths of 4-in. square pipe. Semi-automatic chuck eliminates hand setscrews. With mast and equipment, rig weighs about 16 tons. Height, with mast down, is 10¾ ft.—**Joy Mfg. Co.**—Eng & Min J, Nov, p122

Fills Collapsible Tubes—New filling, closing, sealing machine for liquid materials turns out 15-30 filled tubes per min. Double-fold clipless closure or hermetic closure are possible. Filling mechanism is bronze; hopper is stainless steel. Machine fills tubes from 2 in. dia. to 10 in. long—**F. J. Stokes Machine Co.**—Mod Packaging, Oct, p148

Full-voltage Starter—Designed to control squirrel-cage motors and primary of woundrotor motors of 350 hp. or less at 2,300 v., new starter is actuated by pilot device. It has mechanism immersed in oil.—**Allis-Chalmers Mfg. Co.**—Prod Eng, Nov, p184

Rubber Coupling Joint — Preassembled rubber coupling joint gives multiple sealing, is full floating and cushioned, and is flexible both angularly and lengthwise. Joints are self-sealing and leakproof. For vitrified clay pipe, joints equal pipe in acid and alkali resistance.—**Universal Sewer Pipe Corp.**—Cons Meth & Equip, Nov, p105

Hydraulic Openside Planer—Two cross-rail heads and one side head are provided on 73-ft. long planer. It has 33-ft. cutting stroke and fast table return. Maximum planing width is 72 in. Table-to-rail distance is 72 in.—**Rockford Machine Tool Co.**—Steel, Nov 14, p125



GASHOLDER PISTON HAS NO SLIDING PARTS

Storage of chemical process gases at pressures up to 20 in. of water is possible with dry-seal gasholder made by General American Transportation Corp. A 500,000-cu. ft. unit is under construction. Piston is a circular deck provided with neoprene-coated fabric seals. As gas enters, seals inflate and piston rises. In full position, both seals are extended upward. Relief valve prevents overfilling.—Chem Eng, Nov, p134

New Products (Cont.)

Trapdoor Wrapper—Perforated cellophane wrapper gives packaged produce a chance to "breathe". CO_2 gas escapes and air enters through series of small horseshoe-shaped cuts. Flaps, or trapdoors, on cuts normally remain closed and swing open as gas pressure builds up.—**Dobeckmun Co.**—Food Ind, Nov, p120

High-pressure Compressors—Models L-7-S and O-7-S compressors are intended for industries needing gas at high pressures—compressing natural gas or in liquefied petroleum industry. They are powered by Lorain Model L and O multifuel engines. —**White-Roth Machine Corp.**—Oil & Gas J, Oct 27, p97

Modular Cooler—Stainless-steel, aluminum or zinc-coated steel facings are bonded to plywood modules to form Amorply panels. Panels permit assembly of walk-in coolers wherever refrigeration is desired in a plant.—**United States Plywood Corp.**—Power, Nov, p182

Subzero Rubber—A synthetic rubber remains resilient at –75° F. It promises to solve many problems of motor-vehicle and plane operation in frigid climates where other rubbers become brittle at –60° F. Tires of the new polymer do not stiffen or develop flat spots at the lower temperatures.—**Firestone Tire & Rubber Co.**—Aviation Wk, Oct 24, p28

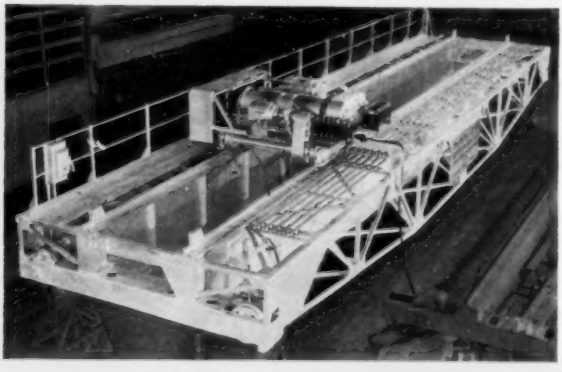
Contact Electrode—A-c., d-c. electrode for high-speed welding is pressed against the metal and drawn straight along the joint. Called Eutec-Hand-Omatic, it welds thin sheets without burn through.—**Eutectic Welding Alloys Corp.**—Weld Eng, Nov, p81

Glass Safety Hat—Of resin-impregnated Fiberglas crown, new safety hat features comparative coolness. Hat is said to be strongest, most resilient crown designed. —**E. D. Bullard Co.**—Coal Age, Nov, p112

Protects Tank Insulation—Outdoor tanks and vessels can have their insulation protected by application of weather- and corrosion-resistant sheets over the insulation. Called Asbestocite, sheets are made of asbestos and cement.—**Johns-Manville Corp.**—Chem Eng, Nov, p144

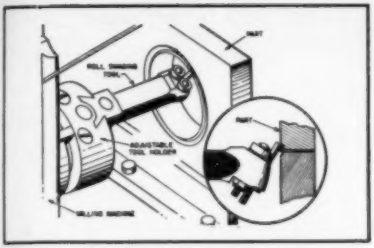
Tests Core Sand—Pocket-size tester indicates hardness of green cores on dial by measurement of penetration depth of ½-in. dia. ball. Blowability of sand mixtures can be expressed in dial numbers.—**Harry W. Dietert Co.**—Foundry, Nov, p220

Tape Reduces Slippage—Button-hole construction of tape for twisters and worsted mills permits entrapped air to pass through tape, reducing slippage and permitting cooler running. For spinning frames, tape has open weave in center instead of button-holes. Continuous-filament nylon staple provides lengthwise stability.—**Russel Mfg. Co.**—Textile World, Nov, p159



ALUMINUM CRANE

Overhead traveling crane is welded aluminum construction. Girder web plates are rolled, other sections extruded. Crane lightness reduced motor size by 5 hp., allowed use of less expensive supporting structure, means lower power costs and rail maintenance. Although crane costs more than equivalent steel crane, economies to users offset initial cost, according to maker Provincial Engrg. Co.—Prod Eng, Nov, p105



SWAGES BEARING HOUSINGS

Experimental work at Northrup Aircraft, Inc., has proved feasibility of reducing bearing weight by swaging of housings and elimination of retainers. Swaged housing can withstand necessary thrust loading. Method consists of machining groove around housing hole and swaging over the edge by a roller-type tool. On milling-machine setup shown, rolling tool is supported by two backup rolls. —Iron Age, Nov 3, p79

Radiant-heating Baseboards — Greater comfort through floor level heat is provided by radiant baseboards. They can be used to replace conventional wooden baseboards and standing radiators.—**U. S. Radiator Corp.**—Eng News-Rec, Oct 27, p118

Superheat Blowtorch—Gun-grip alcohol Blotorch produces a 2700° F. flame for soldering, silver soldering, brazing, and sweating. Length is adjustable.—**Lenk Mfg. Co.**—Elec C&M, Nov, p108

Portable Power Supply—A 50-lb. power supply provides 200-300 ma. dc. for laboratory, industrial, and communication applications. Power requirement is 300 w., 120 v., 60 cycles.—**Radio Corp. of America**—Elec World, Nov 5, p106

Space Heaters—UBS series unit heaters burn natural, manufactured, mixed, and LP gases. Sizes range from 50,000 to 225,000 Btu. per hr. input.—**Surface Combustion Corp.**—Am Builder, Nov, p122

Four-way Switch—Designed to control jet-airplane trim tabs, switch is applicable wherever control of four separate circuits by one switch is required. Unit is intended to control 3-amp., 28-volt dc.—**Guardian Electric Mfg. Co.**—Electronics, Nov, p219

Universal Broaching Machine—Ram-type hydraulic broaching machine, tradenamed Ram-Press, does all conventional broaching operations. Sizes are 4, 6, and 10 tons, with 24- and 26-in. strokes. This low-priced machine is recommended for shops where job runs of parts are processed.—where job runs are processed.—**Colonial Broach Co**—Am Mach, Nov 3, p243

Portable Charger—Selenium-rectifier fast charger for automobile batteries weighs 34 lb. and has carrying handle. It draws 12.5 amp. and has output of 30 amp.—**General Electric Co.**—Elec Whols, Nov, p76

Flexible Coupling—Lightweight, flexible, shaft-coupling, revolving casing is made of aluminum alloy. It is split axially to permit installation or removal in space no longer than the coupling. Both ends are sealed.—**Diamond Chain Co.**—Power, Nov, p174

Self-propelled Welder—Weldmobile supplies own motive power and has means for arc and gas welding. Two models have 300- and 400-amp. welders. Dc. can be furnished to operate lights and power tools.—**Hobart Brothers Co.**—Steel, Oct 24, p90

Insulates Pipe—Fiberglas PF molded pipe insulation, able to withstand temperatures to 800° F., is made of glass fibers bonded by thermosetting resin and molded to standard sizes up to 30 in. It is available with canvas or felt cover.—**Owens-Corning Fiberglas Corp.**—Iron Age, Oct 27, p35

Aluminum Pipe Wrench—Drop-forged from high-strength aluminum alloy, pipe wrench is nearly 50% lighter than steel wrenches. Replaceable alloy-steel jaw inserts are interchangeable. Same insert fits handle or movable jaw.—**J. H. Williams & Co.**—Oil and Gas J, Nov 3, p100

FREE SERVICE TO READERS

As a special service to our subscribers, McGraw-Hill Digest will furnish, without any charge, additional information about any new product or technical development described. Address your letter to: The Editor, the McGraw-Hill Digest, 330 West 42nd St., New York 18, N. Y. U. S. A. —*THE EDITORS*

LUXURY HOTEL with corridor-balconies looks like an ocean liner

AUTOMOBILE entrance has porch supported by unique V-shaped supports

Outstanding Hotel All-Welded

Experimental three-story luxury-trade hotel in world's movie capital is an all-welded structure that is receiving country-wide attention

WORLD'S LARGEST all-welded structure of its type is the new colorful Country Club Hotel in Hollywood. Costing $2-million, this all-welded steel building is modeled after the famous Copacabana Palace, Rio de Janeiro.

It features a color scheme in which each floor is a different color. Ground floor is aqua, second floor salmon, and top floor mustard yellow.

This 224-room hotel has more than half a million welds. There is a 1½-in weld at 2-ft. centers on every member. Eleven arc weldors worked 8 hr. a day, 5 days a week for 9 months. Thirty-nine steel erectors set the pace for the welding gang.

The building is an experimental project of Great Lakes Steel Co. Structural members are lightweight alloy steel. Studding is formed of 16-gage U-channels, and joists of 14-gage. To gain extra strength, U-channels were welded back-to-back where reinforcement was needed.

The only conventional structural steel is in the lobby. Largest piece is a 24-in. I-beam, 65 ft. long, across the top of the lobby.

Steel members were cut on the job with a 17-in. friction saw. Measurements had to be close, so tolerances were held to $\frac{1}{16}$ in. Welding electrodes used were $\frac{3}{16}$ in. with some $\frac{1}{8}$ in. rods on the heavier members.

A unique feature of the hotel is that it has no conventional corridors. Instead, exterior corridor-balconies run around the building on all three floors. Balcony handrails lean out at a rakish 15° angle.

To absorb earthquake stresses, 12-gage steel strap 2½-in. wide is employed as lateral bracing on all floors. Use of the strapping also avoids drilling or flame-cutting holes in bearing members.

An eye-catching feature of this luxury hotel is the unique design of porte-cochere supports. V-shaped supports connected by saddle strips have points of the V's stuck into ground cement and hidden by brickwork and foliage.—Weld Eng, Nov, p24

Fruit-Flavor Recovery Unit Produces Good Essences

Concentrated volatile fruit flavors, suitable for use in fruit jellies and candies, can be recovered by a unit designed by the Dept. of Agriculture's Eastern Regional Research Laboratory.

The unit was employed first in experimental work on apple juice and later to other fruit juices. Juice is pumped through a steam-heated evaporator, then to a vapor-liquid separator.

Vapor passes to a fractionating column, in which it is concentrated, and through a water-cooled condenser. Gas not condensed here is chilled in an ice bath and stripped in a scrubber.

Efficiency of process varies with the juice. Evaporations of 15–20% were found to give best results. The more fragrant and lighter fractions of aromas were more readily recovered than heavier, more pungent undertones.

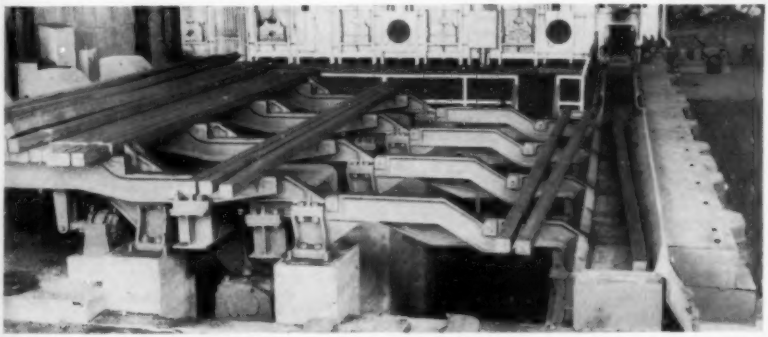
Grape essences contained top fragrance of grapes but lacked heavier undertones. Strawberry essences were light in character. Peach essences had a strong fresh-peach aroma. Huckleberry essences had good strength, while blackberry essences lacked heavier portion of aromas. Rhubarb essences were characteristic but indicated a cooked flavor.—Food Ind, Nov, p47

Industrial Color Television

Remote observation of ramjet engine tests at Wright Aeronautical Corp. promises to be a potential industrial use of color television. Equipment was made by Smith, Kline & French Laboratories.

As in other combustion research work, flame color is an index to combustion performance. So color television enables Wright engineers to study color changes at a safe distance.

Ultimate objective is to locate a television camera against a quartz window in the side of the engine. This will permit study of compression, fuel mixing, combustion, and exhaust-gas expansion. —Prod Eng, Oct, p157



MACHINE UNSCRAMBLES AND TRANSFERS STEEL BILLETS

New rod mill installed by Colorado Fuel & Iron Corp. at Pueblo plant has this billet arranging machine, the first of its kind to be built. Billet lifts of 9-27 tons may be deposited on the machine, which transfers them sideways to the furnace charging table. Should billets become out of line, machine aligns them and shuffles them to charging table. No labor is needed, thus eliminating a hazardous occupation. Builder of machine was Morgan Construction Co.—Steel, Oct 24, p58

Self-Service Meats Raise Store Dollar Volume

Prepackaging of self-service meats is still in the pioneer stage, but already many problems have been met and solved. Kroger Food Foundation has encouraged many improvements.

One of the first was a satisfactory wrapping material. Collaboration with Du Pont produced cellophane film M.S.A.T. 80, which permits retention of meat color and control of microbial growth.

Other improvements were: (1) maintaining the cutting room at 56–60° F., (2) exposing cut meat to air for 15 min. to develop optimum color before wrapping, (3) stiffening package with backing board or tray to prevent accumulation of juices, (4) displaying at 30–40° F. to prolong saleable life.

Cost of wrapping material per pound of packaged meat is higher than for meats handled in the service department. Per-pound cost of selling has been brought down to 8.4% greater than the old way.

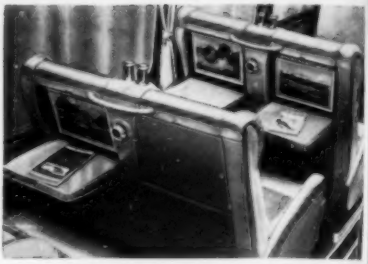
But stores have found that the new method has meant a greater sales volume. Proof is that after conversion to prepackaged, self-service meats Kroger experienced a 94% increase in meat dollar sales. Meat sales now account for 32% of total sales in place of former 26%.—Food Ind, Nov, p90

Darkroom Light Meter

Measurement of average illumination in photographic enlarging can be made with a new experimental meter. Result is a greater percentage of successful enlargements.

The meter has a phototube probe, which is placed on the enlarger easel at a representative part of the picture. A dial on the meter is set to correspond to the photographic speed rating of the paper. Another dial then indicates the best time exposure for that particular negative.

Meter circuit is essentially a Wheatstone bridge, of which one leg can be unbalanced by light shining on the phototube. Sensitivity is sufficient for enlargers when using exposures ranging from 10–80 sec. It amounts to 7×10^{-8} f-c., or 2.11×10^{-6} lumens.—Electronics, Nov, p90



FOR WRITING ENROUTE

Compagnia Italiana Autoserize Turistici, Italian tourist bus line, believes in complete comfort on scenic tours. Tour buses are fitted with roll-away sightseeing roofs. Backs of seats fold down to provide desk space.—Bus Trans, Nov, p66

Acrylic Lenses for Cars

Many U. S. automobile manufacturers are turning to injection-molded acrylic lenses for automobile lights. Chrysler will use acrylic lenses on all models except for sealed-beam headlights.

Acrylic lenses are superior to glass in brilliance. Although initial material cost is higher than for glass, savings result from use of thinner lenses, lighter lamps, and lamp housings. Breakage is almost eliminated.

Other advantages of acrylic lenses over glass: better color stability; higher candle-power delivered; special refracting surfaces possible were impractical in glass; dimensional accuracy; inexpensive snap-in assemblies are possible.—Mod Plastics, Nov, p101

Automatic Rig Now Reduces Round-Trip Time by 25%

The "automatic drilling rig" of Humble Oil & Refining Co. has now been developed to a point where a substantial savings in drilling time can be made. Round-trip-time, which is about 13% of total drilling time, has been reduced by 25%.

Primarily responsible for the saving is a block deflector. This device allows the blocks to move up and down while the stands of drill pipe are being made up or broken out. Formerly, blocks supported the drill pipe during screwing and unscrewing operations.

A remote-control pipe racker holds the pipe, thus letting the blocks be unlatched and started down the rig. Block is pulled over to a side carriage and descends along a special rail while the pipe is being stacked.

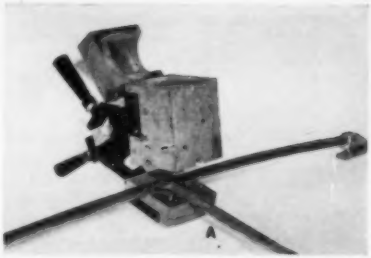
Another interesting item is the block stopper. This automatically stops the blocks at a predetermined point up the derrick. A safety stop prevents blocks from going through the crown block.

Other new developments on the rig are power elevators, adjustable stabbing board, blowout preventer and master gate, hydraulic piston puller, coring reel level-winder, improved mud-mixing device, and an experimental wire-line blowout preventer.—Oil & Gas J, Nov 3, p58

Harvester Shows 87 Models

International Harvester Corp. has announced a complete line of 87 heavy-duty truck models, to be known as the "L-line." Company believes the line fulfills all types of required haulage.

Line features four classifications of 4-wheel trucks: Standard, 4,200-40,000 lb. gross vehicle weight; Schoolmaster, comprising five bus models, 12,500-24,000 lb. gvw.; Loadstar, 16,500-29,500 lb. gvw.; and Roadliner, 16,000-30,000 lb. gvw. Three power units are available on all models.—Fleet Owner, Dec, p48



***CABLES** to be welded are laid in the mold cavity below powder crucible as . . .*

New Process Welds Copper

Copper to copper and copper to steel are readily welded by a new process with no outside source of heat. Known as the Cadwell process, it was developed by Electric Railway Improvement Co.

It is similar to thermit welding with the exception that iron oxide has been replaced by copper oxide. Reduction of copper oxide by the aluminum yields molten copper at 4000° F.

A combination crucible mold is machined out of graphite. Parts to be welded are placed in the mold cavity, and a steel disk is laid in the bottom of the crucible over the hole leading to the mold.

Powders are then mixed and ignited with a flint gun. Molten copper melts the steel disk and runs into the mold.

Present major application of the process is welding of cables. Cost is low, and cleaning is the same as for brazed joints.—Steel, Nov 14, p84

No-Tarnish Metallic Yarn

A chemically metallized yarn, developed in Italy, can be produced on cotton, nylon, rayon, or silk. It will not tarnish. Metallic finish can be either gold or silver and is inexpensive. Treated yarn is said to increase one-third the fabric strength. It will stand all types of finishing.—Textile World, Nov, p170

Knit-Nylon Set Continuously

"Trianized" is the trade-name applied to Triangle Finishing Corp.'s non-patented process for continuous setting of knit-nylon fabrics. Objections to conventional processes seem overcome and nylon knit goods, after being "trianized," have almost the same properties of woven fabrics in respect to control of properties and uniformity.

To handle fabric on a continuous single-thickness basis and to define accurately the length and width dimensions, a pin tenter equipped with automatic tension control, overfeed, and uncurling devices is used. Fabric selvage is fed to pins. Complete control of fabric dimensions is obtained by variation in speed or widths. High-temperature, high-velocity air is setting medium; temperatures used are just below that of nylon melting point.

Fabrics of mixed or blended fibers—including nylon and cotton, wool, silks, viscose rayon, acetate rayon, and cupra rayon—have been "trianized."—Textile World, Nov, p140

Steam Generator for Piledriver

Steam for crane and piledriver on a Chicago breakwater job is being supplied by a portable steam generator, which saves 66% in fuel and raises net working time of crew 12%. Most piles are driven by differential steam hammers handled by floating equipment. Return section can be handled by a diesel crane reaching across channel. It is used when lake is too rough for use of floating equipment.

Generating unit, developed by Vapor Heating Corp., is 5x7 ft. in plan and 6 ft. high. Evaporating capacity is 3,000 lb. per hr. The unit develops a full head of steam in 2 min. A steady 125 psi. is delivered to hammer. Hammer never draws pressure down, even under sustained driving. Driving crew is never idled waiting for steam. Ten man-hours per shift are saved. Fuel consumption is 100 gal. per day compared to 250–300 gal. previously consumed.—Eng News-Rec, Nov 10, p44

Ultrasonics Degrease Steel

Degreasing of sheet steel and small stampings is a new application for ultrasonics. The high-frequency sound waves agitate the caustic cleaning solution. Result is a dramatic scrubbing action, doing an ordinary 20-min. job in 10 sec.

Sound waves can be generated by a magneto-strictive transducer made to oscillate at 33,000 cps. by a high-frequency electric current. They cause the liquid molecules to bounce around, producing forces equal to several times the force of gravity.

Among the other uses of ultrasonics occupying the attention of research engineers are combining of metals of different metling points, degassing of molten metals, vaporizing non-volatile fuels for new types of carburetion, tinning aluminum wire, drying paper, measuring elasticity of metals.—Prod Eng, Nov, p153

New Chrysler Truck Line

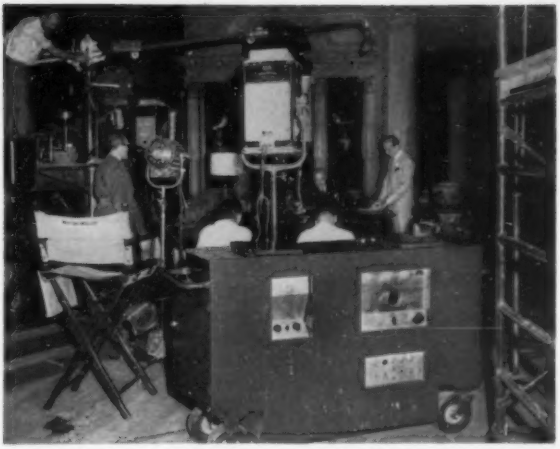
Dodge, Fargo, and De Soto are introducing new truck lines aimed at lower hauling costs. The three lines range from 4,850 to 23,000 lb. gross vehicle weight.

New features will include: a dust- and splash-proof electrical system, a 5-speed synchro-shift transmission, cycle-bonding brake lining, a steering-post gear-shift lever.—Am Auto, Dec, p65

About February's Report

Titanium—"wonder metal" of tomorrow and our next major structural material—has outstanding possibilities. Its development foreshadows immediate advancements in supersonic aircraft, rocket, and gas-turbine design and improvements in practically innumerable industrial and consumer products.

ACTORS PROMPTED IN MOVIE MAKING



Electronics permit motion-picture director to cue his actors without interfering with regular sound system. Key to unit is magnetic-field transmitter in foreground. Modulated field is picked up and demodulated in concealed receivers and conveyed to actors through earphones hidden from camera. Loop-receiver is worn around neck or, with strapless evening gowns, in actress' hair. —Electronics, Nov, p66

New Citroen at Paris Fair; Britain Draws 530 Exhibitors

Seven hundred exhibitors showed at the 36th French automobile show at Paris. For the first time prices were fixed, delivery dates could be given, and state control of industry appeared at an end. French production was to reach 300,000 units for 1949 as against 198,372 units in 1948.

Outstanding among light cars was Citroen's 4-passenger car. The company hopes to reach a production of 500 units per day this year. Car has a 93-in. wheelbase and a 49¼-in. tread front and rear. It has a sustained speed of 37 mph. and will make 52 mi. per gal.

Engine is an air-cooled, opposed twin unit. Car is equipped with a single plate clutch, four-speed transmission, and front-wheel drive. Crank case and transmission housing are made of light alloy. —Auto Ind, Nov 15, p26

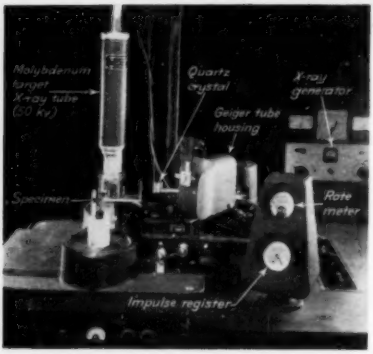
Britain's second post-war automobile show drew 530 exhibitors—32 British automobile manufacturers, 16 U. S. and Canadian, eight French and two Italian. The British buyer will not benefit by increased activity in the industry. Wait for cars will be longer; prices will be higher when delivery is made.

No foreign-made cars will be sold locally. French and Italian manufacturers are hoping for preferential treatment, but hopes seem unjustified.

Citroen will continue to assemble in England. Renault has received permission to start assembly there. Subassemblies will be shipped from France and be assembled in England. Fittings will be predominantly British.—Auto Ind, Nov 1, p24

Lepidolite—Ceramic Flux

Lepidolite combines two of the most active ceramic fluxes—lithia and fluorine—and is suited to ceramic uses in fields of bodies, glazes, or enamels. Research shows that a combination of 40% lepidolite, 50% nepheline, and 10% tremolitic talc is effective in lowering maturing temperatures.—Ceramic Ind, Nov, p74



SPEEDS STEEL ANALYSIS

U. S. Steel Corp. is now applying the Geiger counter to analysis of steel samples. X-rays from 20-milliamp., 50-kv. molybdenum target tube strike the steel specimen, ionizing atoms and exciting fluorescent secondary rays characteristic of alloying elements. Fluorescent rays pass to crystal monochromator and to Geiger counter.—Prod Eng, Nov, p154

Advantages and Cost Favor Individual Street Lights

Electronic control of street lighting is finding wider use by Connecticut Light & Power Co. Last year, about 1,500 individually-controlled lights were installed as a result of favorable experience on a previous 200-light experimental installation.

Advantages gained have been: (1) reduced space requirements, (2) lower tree-trimming costs, (3) elimination of complete circuit outages, (4) improved appearance of overhead lines, (5) increased safety, (6) improved service from turning on lights when needed, and (7) increased availability of service in remote areas.

The individual control, made by General Electric Co., is plugged into a receptacle in the top of the hood. A photo-tube actuates the device through an amplifier tube, which causes a control tube to operate a 10-amp. relay. The street light is thus turned on and off as required by the changing light intensity. A majority of the lights come on within a 3-min. period.

Cost of the electronic control depends to a large extent on tube life. The manufacturer estimates that tubes should last at least 3 years. Other factors that determine the economics of individual control are variations in systems, relative losses for various methods, and investment costs.

Cost figures are not yet complete, but even now the utility company's records show that increased investment for individually controlled multiple luminaires is more than offset by an investment decrease for supply facilities.—Elec World, Nov 5, p68

New Process for Acrolein

That acrolein can be made economically by the direct oxidation of propylene has been demonstrated on a large pilot-plant scale by Shell Development Co. Propylene is a gas produced in petroleum-refinery cracking.

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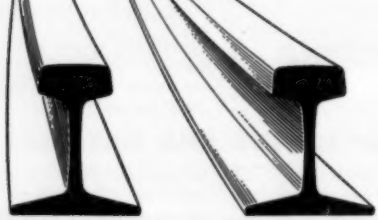

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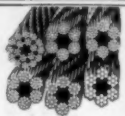

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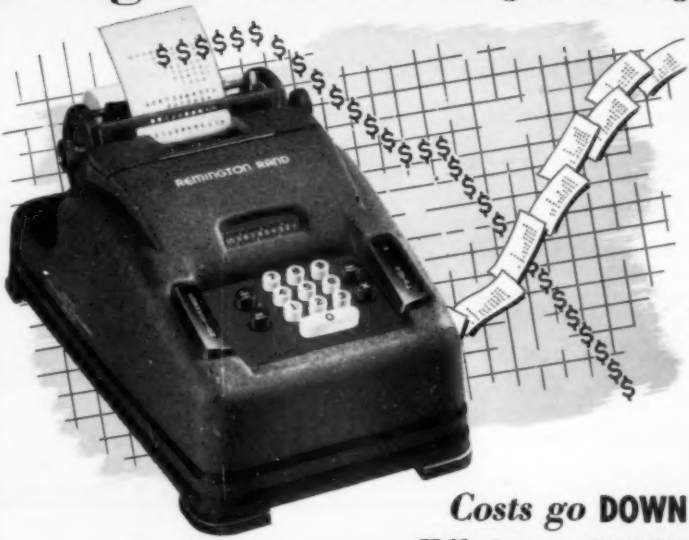

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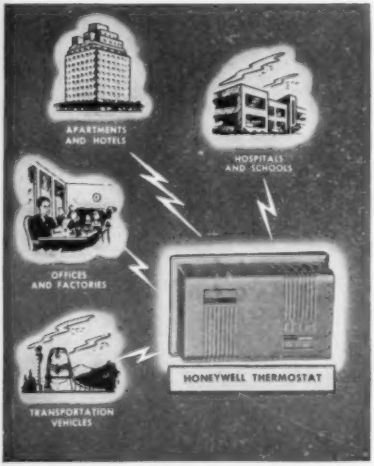

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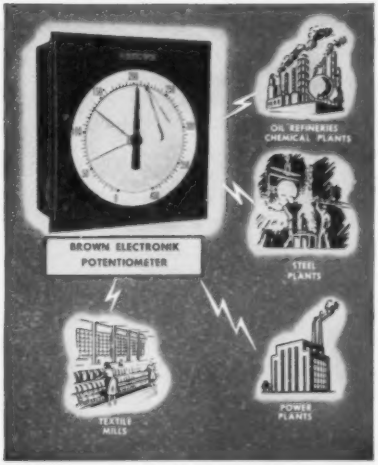

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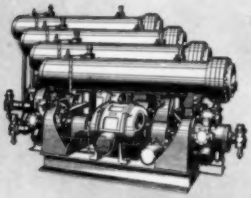

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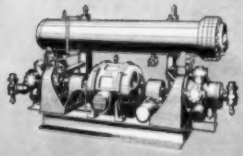

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